A Database Publication

THE MICRO USER

Volume 8 Number 3 May 1990 £1.50

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HOTKEY

Instant action from your Archimedes

8 BIT WIMPS

Bring desktop power to your BBC Micro

RANDOMITY

Unpredictability in machine code

REVIEWS

Knowledge Organiser
Teletype • Craftshop 1
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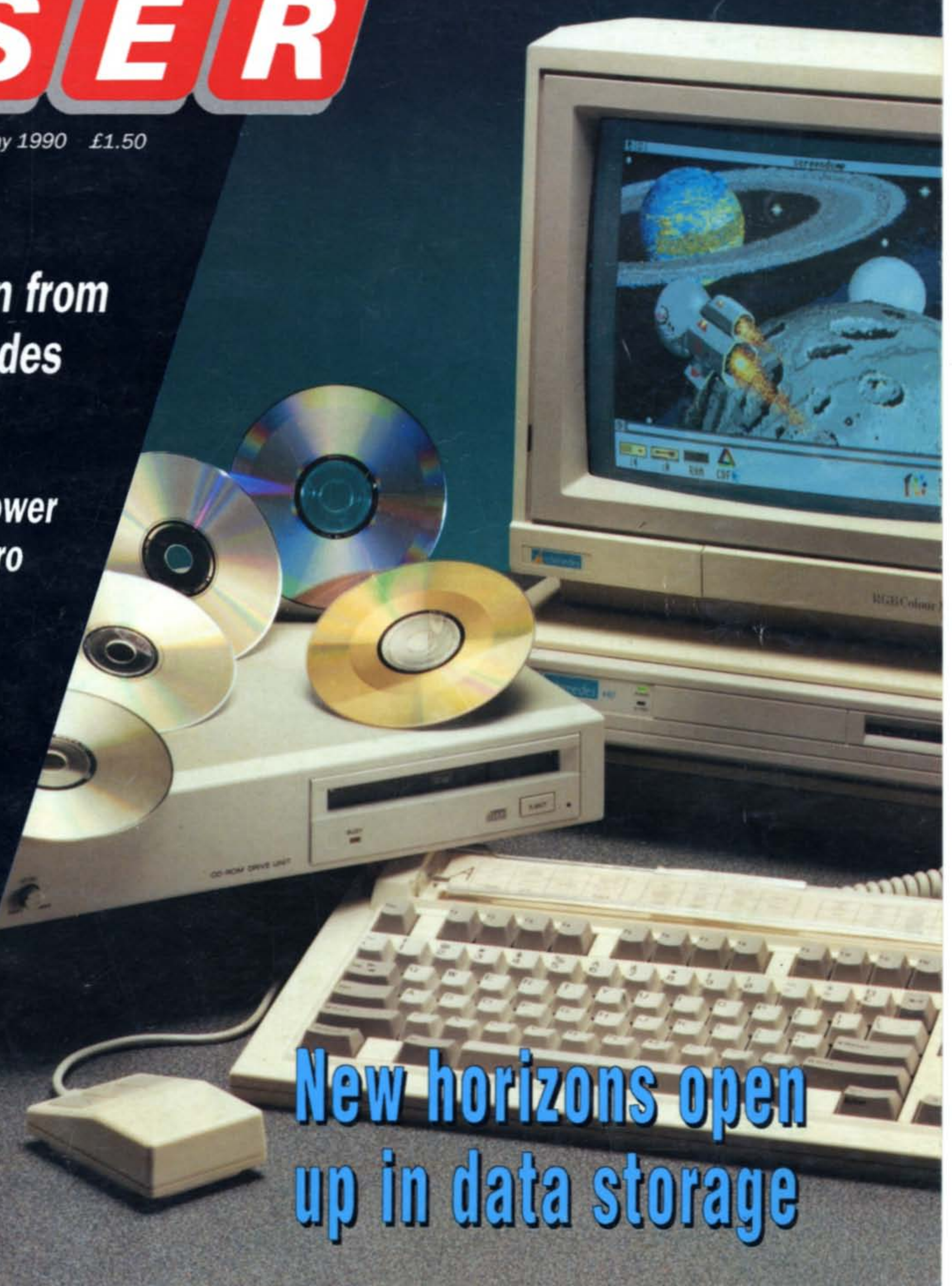

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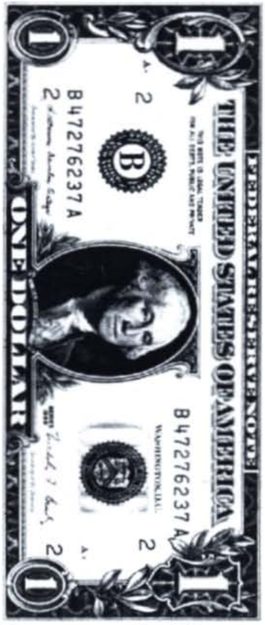
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Reviews Coordinator	**Pam Turnbull**
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The Micro User welcomes new program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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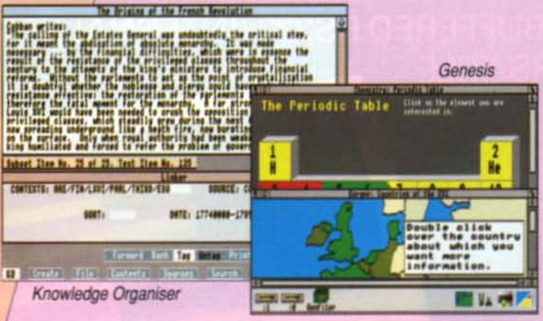
Cover story

Now you can use CD-Roms – the storage technology of the future. Find out how to cram 550Mb of data on to a disc the same size as your 5.25in floppy. Discover how you can enter this exciting new world and what other possibilities are opening up. Complete sets of major literary works are available for prices starting at £5 – yet individuals, schools and businesses can have their own resources put on to this media. Turn to Page 36

Newcomers ON TEST


The Periodic Table
Double click over the country about which you want more information.

Genesis

Knowledge Organiser

16 Genesis
Something completely new arrives for the Archimedes: Is it all it's cracked up to be?

40 Knowledge Organiser
This free-text database is examined and compared with its MSdos rivals.

101 Finding a Voice
We explore a superb new package that makes sound editing on the Arc a cinch.

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 72 of the February issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of The Micro User. Turn to Page 114 to find just what you're looking for – from cheap modems to complete computer systems.

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Hotkey grabs screens

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Try out a versatile data storage and retrieval system.

63 Hotkey *
Archimedes operations ready in an instant.

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It is possible to have a desktop environment on your 8 bit BBC Micro. Start of a new series telling you how.

80 SuperCal *
What you need when a calculator isn't good enough and a spreadsheet's just too much.

99 Random *
Discover how easy it is to create unpredictable events in 8 and 32 bit machine code.

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We reveal the secrets behind the success of this leading software house in an interview with its managing director.

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A thank you letter turns into a lesson as a group of pupils have a close encounter of a very strange kind.

25 Education Reviews
Looking at the best in software for the BBC Micro series in schools including:

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- Ambleforth plotter
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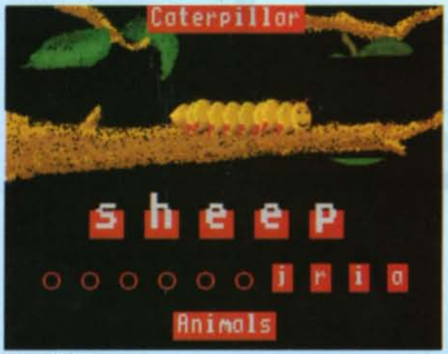
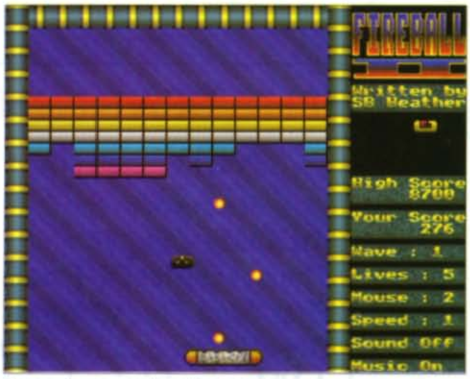


Fun School 2

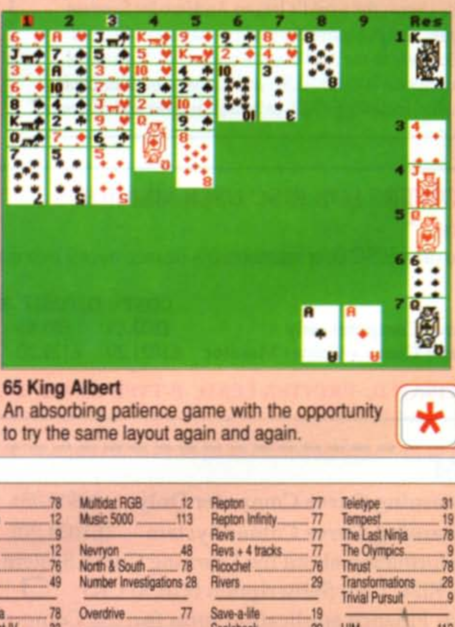
Craftshop

SOFTWARE SCENE



Our reviewers cast a critical eye over the latest games releases – *Page 47*

Type-in Game



65 King Albert
An absorbing patience game with the opportunity to try the same layout again and again.

*

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For the Archimedes series and A3000 only:

- Demonstrations of 4Mation's Craftshop2
- DeskTop !ClockCalc accessory

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THE MICRO USER

Art for Art's sake

In our special Graphics issue NEXT MONTH we pack in features, reviews and utilities covering all aspects of computer graphics.

Plus an overview of art packages for the Archimedes.

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New
from
Acorn

THE LEARNING CURVE

THE LEARNING CURVE

NEW FROM ACORN

It consists of:

An A3000 Computer
The new faster PC Emulator
First Word Plus v2 Word Processor
Genesis Information System
A Video explaining how to use the package
Information on the National Curriculum

Save Over £240

The free software bundled with this package is worth £300, and yet the entire system costs only £57.50 more than the standard A3000.

Ideal For Home & Education

This system is tailor-made for the home user with children. The A3000 and other Archimedes systems are increasingly used in schools and this all-inclusive package with the excellent Genesis software will supplement Information Technology in the National Curriculum.

Just Right for Home & Business

A Word Processor is essential in all home systems, and 1st Word Plus with its built-in spelling checker is excellent. The new PC Emulator also means that over 95% of PC software (DBase, Lotus, Wordstar etc.) will run on the A3000 straight away.

RISC User

RISC User is the world's largest Archimedes Support Group, and publishes the leading magazine devoted exclusively to the A3000 and Archimedes. An annual subscription is **£16.90 (UK)** and carries a multitude of benefits, including FREE technical support and discounts.

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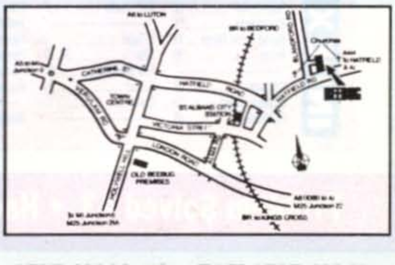

If you would like a leaflet on the Learning Curve Computer System write to:
BEEBUG Ltd 117 Hatfield Road, St Albans, Herts AL1 4JS or *Phone 0727 40303* or *FAX 0727 60263*

News BEAT

A3000 hint as Coleman leaves

PROMISE of an exciting new initiative on Acorn's home micro front was the parting shot of managing director Harvey Coleman as he left to return to its principal backer Olivetti.

Acorn remained tight-lipped over Mr. Coleman's comments as trade sources speculated about a possible re-launch or price cut for the A3000.

Further speculation surrounded the company's latest accounts, due out shortly after Mr.Coleman's departure. He was put in by Olivetti two years ago to sort out the financially ailing Acorn and his recall could be a signal for financial optimism.

Mr.Coleman has been promoted to become president and chief executive officer of Olivetti Systems and Networks in Canada. New managing director at Acorn is Sam Wauchope who moves up from his previous post as sales and marketing director.

Commenting on the changes, Acorn's chairman Alex Uboldi said Mr.Coleman's promotion is recognition within the Olivetti Group of the "excellent results" achieved by Acorn under his management.

"Sam Wauchope has also been a highly significant member of the management team for four years and it is a reflection of our confidence both in the plans that have been laid and in Sam himself that we are now appointing him to the position of managing director", he added. "We believe that we will see some very exciting developments for Acorn as these plans come to fruition".

Making his promise to home consumers, Harvey Coleman said: "We are now doing significant business in the home and an exciting new initiative that we will shortly be announcing will enhance this particular aspect of our business".

Sam Wauchope added: "I am looking forward to seeing the plans that have been formulated become reality now that Acorn's place as a quality supplier of British technology products is so widely recognised. The last 12 months have been very good for us, and I am expecting the next 12 to be equally so".

Mr.Wauchope studied economics and accountancy at Glasgow University. He joined Acorn as finance director in 1985, became sales director in 1988 and assumed additional marketing responsibilities last year.

His position as sales and marketing director will be taken over by Michael O'Riordan who until recently was group marketing director of ITL.

OUT: Harvey Coleman

IN: Sam Wauchope

Arc trains doctors

BEFORE they are let loose on patients, many of tomorrow's doctors and dentists are learning their skills on Archimedes micros programmed to simulate the medical and clinical problems they will face when qualified.

The machines form the core of a new computer-based teaching facility in the Department of Physiological Sciences at Newcastle University's Medical and Dental Schools.

The multi-disciplinary laboratory is now equipped with an additional 16 Archimedes 410s bringing its total up to 25 systems connected by an Acorn Econet network stretching over one kilometre and used by many departments of the university.

"As a teaching resource for a medical school, the 32 bit Acorn Archimedes machines are excellent, offering both power and flexibility", said one head of the laboratory, Dr.Gary Green. "We use them to collect and process data in real time from medical monitoring equipment such as electrocardiograms, for hearing tests, speech analysis and modelling neural networks".

Staff and students use the micros to simulate and model biochemical and phsiological processes, solve medical problems and reproduce clinical situations.

In one year, the teaching laboratory caters for up to 300 medical students, 70 dental students and 250 budding scientists.

Keep it safe

PUBLISHER Mandarin (01-581 9393) has produced an updated version of Datatheft, the computer security book originally written by top consultant Hugo Cornwall.

Dealing with computer security problems in industry, it costs £5.99.

DTP guide

AN updated version of The Ivanhoe Guide to Desktop Publishing has been brought out in association with the British Printing Industries Federation. It is aimed not only at those wishing to buy DTP equipment but also at members of the industry themselves.

Combining a large number of articles written by DTP experts, with product reviews and profiles it is the second edition of this useful guide, costs £5.95 and is available through most bookshops.

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Beebug and RISC User Magazines

We also publish the acclaimed Beebug and RISC User magazines for the BBC Micro, Master and Archimedes/A3000 computers. Back issues will be available at special prices. The editorial team will be on-hand to discuss the magazines and their contents.

Beebug DTP

Ovation, the new **DTP** system for the Archimedes will be on demonstration, along with our **scanner, 5 1/4 disc buffer** and our new **memory upgrades** for the A3000.

Demonstrations

Our technical team will be present to demonstrate and discuss items of software and hardware that might be of interest to you.

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Companies represented include:

Acorn Computers

A number of Acorn staff will be on hand to demonstrate and discuss the complete range of computers including the A3000.

Colton Software

Pipedream 3, the efficient spreadsheet/ wordprocessor/ database for the Archimedes will be on demonstration together with View Professional for the BBC B and Master.

EMR Ltd

Mike Beecher will be attending to demonstrate the popular Studio 24 Plus MIDI Music package for the Archimedes as well as his range of MIDI add-ons for the BBC and Master series.

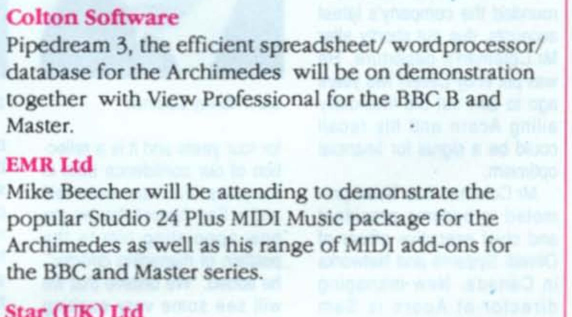
Star (UK) Ltd

See the business and professional range of Star printers in action including the new XB24-10 colour printer. The range of Star laser printers will also be on demonstration.

Fourth Dimension

Fourth Dimension will be demonstrating their excellent range of games for the BBC Micro and the Archimedes..

Events & visiting companies subject to change without notice.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ALMA RD
HOLYWELL HILL
OLD BEEBUG PREMISES
To M1 Junction 6 M25 Junction 21A
A6(1081) to A1 M25 Junction 22
BR to KINGS CROSS

Wheels for BBC Micro

BBC Micro owners who have coveted the excellent Archimedes car racing game E-Type will soon have their own version from The 4th Dimension (0742 700661).

Author Gordon Key has been working hard to squeeze every possible feature into the conversion which will take advantage of multi-loading to increase available memory. It should be available by early May costing £9.95 for cassette, £14.95 for 5.25in disc.

The Olympics

BBC E-Type is just one of a number of new games from the 4th Dimension.

Apocalypse is a 3D solid graphics offering from Gordon Key who was also responsible for top selling golf simulation Holed Out. The Archimedes game features digitised sound effects and challenges players to rescue a solar system from an evil-dictatorship. Price £29.95.

Sporting action is featured in the second Archimedes game The Olympics, which includes diving, javelin throwing, swimming, pole vaulting, skeet shooting and canoeing. Several players can compete against each other. Price £19.95.

Freedom Fighter for the Archimedes is a combat action game from Arcade Soccer author Peter Gillett. Using machine guns, rocket launchers and other weaponry, the player takes on enemy troops, tanks and aircraft. Price £24.95.

Animated arcade adventure Man At Arms for the Archimedes features a warrior armed with a deadly sword and magic potions trying to conquer ancient castles. Price £19.95.

Due out in June for both the Archimedes and BBC Micro is 3D arcade strategy game Inertia, designed to test a player's thought and dexterity. Archimedes price will be £19.95. BBC cassette £9.95 and BBC 5.25in disc £12.95.

Now RTS takes on MicroLaser

DISTRIBUTION rights to the new MicroLaser from Texas Instruments have been secured by RTS Technology (01-267 7541).

The MicroLaser is a table top, entry level printer offering letter quality text and high resolution graphics at speeds of up to six pages a minute at 300 x 300 dpi.

Its modular design means that users can upgrade from the Hewlett Packard Series II emulation supported on the base model to an Adobe Postscript version containing 35 fonts by plugging in an additional cartridge.

It is supplied with a standard ram memory of 512k which can be upgraded in 1Mb increments to a maximum of 4.5Mb for sophisticated graphics tasks.

The Hewlett Packard Series II emulating version of MicroLaser costs £1,435. Adding Postscript emulation including 1.5Mb ram puts the price up to £2,495.

Musical Pursuit

ALREADY a success on other major formats, Domark's computer version of the classic board game Trivial Pursuit has now been converted to the Archimedes with more than 3,000 questions from the Genus edition.

While remaining faithful to the original board game, Trivial Pursuit on the Archimedes features new-style questions incorporating both sound and music. Ever tried naming a tune played backwards?

Complete with "TP", the animated question master, Trivial Pursuit for the Archimedes costs £29.99. On the grid for an early Summer release is the Archimedes conversion of Hard Drivin', the Christmas hit from Domark/Tengen (01-780 2222).

This coin-op conversion features a speed track where the challenge lies in beating the fastest time and a stunt track where driving skills count. Price to be fixed.

Video guides

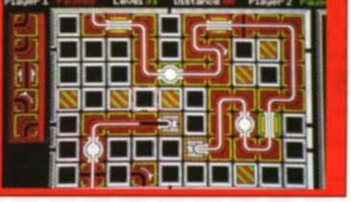
THE National Interactive Video Centre (01-387 2233) has produced two new publications designed to help users of this media.

Interactive Video Yearbook 1990 combines more than 100 pages of articles and reports with a 100 page guide to the British IV market. It costs £40.

The Interactive Video Courseware Catalogue 1990 is an update of the UK's first comprehensive guide to off-the-shelf IV courseware and resource discs published by the centre in 1988. With 300 pages, it costs £25

Piping hot!

SHOWN below is a preview of Pipe Mania from Empire (0268 541126). This superb one or two player game tests skills of coordination and forethought as you try to build the longest route for the water to flow along. The two-player version requires enforced cooperation while you try to make the liquid flow through more of your own pipes. Next month – exclusively to *The Micro User* – a playable demo of Pipe Mania will be available on the subscription disc. So make sure of your copy by subscribing now. See Page 129.



Cartridges for Master

JAFFA Systems (0222 887203) has announced a new Master Compact cartridge adaptor which increases the expansion capabilities of the micro by providing a cartridge socket compatible with both Master and Electron cartridges.

The printed circuit board plugs into the side expansion connector and includes a switch to select between Master or Electron cartridges. All the relevant signals are either connected or simulated to allow rom and ram boards, language and interface cartridges to be connected.

Using the adaptor, the Romplus 144 sideways rom cartridge for the Electron can now be plugged straight into the Master Compact. It holds seven roms and a 32k ram and also comes from Jaffa Systems.

The Master Compact cartridge adaptor costs £25.

RISC USER

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Gravity on the Archimedes
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Court action over Email typesetting

ONE of Britain's major electronic mail typesetters Wordstream (0202 752155) has taken out a temporary High Court injunction against Typefit, a company set up by two of its former employees.

It is claimed that the ex-members of staff misappropriated Wordstream's software for use in their new business based at Ringwood.

"Typefit started mailshotting our clients saying that they could take Wordstream files. Our technology is unique and no one can take Wordstream files except us", said company head David Furlonger. "When we realised they were mailshotting our user base, we went to court and invoked the provisions of the 1988 Copyright Act. This means that any company which even offers a translation service of the Wordstream technology is infringing sofware copyright by the very possession of the proprietary software codes.

"We have grown to become a national Email typesetter after a huge investment in software research and development and we are not about to let anybody have our technology".

The day before *The Micro User* went to press, Mr.Furlonger had returned for a second hearing.

"Typefit gave into the court a disc purporting to contain Wordstream data, despite their denials at the previous hearing", he added.

"I am being sent the disc and will be checking exactly what is on it".

Wordstream has a user base of 3,000 customers who send their computer-created typesetting text by Email to be processed at its Poole headquarters.

Typefit could not be contacted at its Ringwood number.

Open day will aid youngsters

Technical advice was a key feature or the packed open day held at Watford Electronics recently

UNEMPLOYED youngsters, underprivileged children and the handicapped will benefit from a fund raising scheme jointly sponsored by publishers of *The Micro User*, Database Publications and top Acorn dealer Watford Electronics.

The two companies are to collaborate on yet another open day at Watford Electronics and charity cash raised at the event will go to provide vital micro equipment for the Get Set Community Centre which caters for the needy youngsters of Watford.

Following the success of the Mid Winter Open Day in January, editorial staff of *The Micro User* will travel to Watford on Sunday, April 29 for a follow-up Spring Open Day. They will distribute back copies of the magazine and copy cover disc programs on to visitors' own discs in return for donations to the cause.

Head of Watford Electronics Nazir Jessa will then double the money raised with the total being spent on computer equipment for the centre.

"This offer could not have come at a better time", said acting manager of the centre Ervin Lewis. "We have not been open very long and have had to spend a lot of money on furnishing our premises. "We have a desperate need of a computer but are forced to rent one on an occasional basis. It poses a great problem for us.

"If enough money is raised from this kind offer, it will be a very welcome bit of new technology which will help us start the younger children using micros and will help the older ones in their search for jobs. We could also use it for administration leaving us more time to spend with the young people".

Another new feature of the Spring Open Day will be a special section set aside for giving technical advice to educationalists.

Former teacher and education guru to Database Publications Peter Davidson will join with staff of Watford Electronics to meet teachers and LEA representatives, discuss their problems and come up with technical solutions.

The open day will follow the format of its predecessor which attracted more than 1,300 visitors.

Staff of Acorn Computers and top software houses will be on hand to give advice on the latest software, hardware, add-ons and peripherals available and there will also be a chance to pick up bargains.

Watford Electronics (0923 37774) is at Jessa House, 250 Lower High Street, Watford and the event will be open from 10am to 4pm.

New RPG goes online

HERALDING the birth of a whole new concept for multi-users/role-playing games, Bloodstone is now up and running exclusively on electronic communications service MicroLink (0527 67585).

Already drawing a large following, it has notched up a number of firsts in the world of multi-roleplaying adventures.

Bloodstone is the first 24 hour, no re-set game of its kind and the first to offer total freedom of movement in three dimensions.

Up to 256 players can take part combining loving, killing, buying and selling in an environment which can be constantly changed.

Realistic combat routines rise above the fighting in other games not relying solely on strength. Dexterity, help from other characters, weapon and armour strength are taken into account to give battle a whole new dimension.

Other new features include buying and selling, a peer facility allowing players to see great distances, a think command so players can communicate telepathically, use of spells, the ability to teleport yourself to other levels and polymorph, allowing the player to change from a human into an insect, monster or any other life form.

"It is an escapist's paradise", said project co-ordinator for Bloodstone Ltd, Tony Cox. "If you wanted to you could practically live your life within the game, escaping from the real world, meeting other people and taking on a completely new character".

Devised by author Rob Muir, Bloodstone covers 14 levels with players aiming to rise to the rank of Lord.

There is no surcharge for MicroLink subscribers who play during the day, but a charge of 3p a minute is levied after 6pm.

Arc springs surprises

THE first All-Archie show held in London by Cambridge International Software was voted a resounding success by attracting 1,500 visitors who travelled from as far afield as Manchester and Glasgow.

"One man had driven with his family 250 miles especially for the fair", said Mike Fowler of CIS. "He left happily enthusing that the journey had been well worthwhile".

Held at the Central Tutorial College near Russell Square, the Archimedes Spring Fair gave a full picture of the software and hardware which is available and attracted many exhibitors not normally seen at the larger shows.

Many teachers turned up to see what is new for Archimedes machines and were not disappointed.

Two new administration packages were on show: Pre-emptor – by Pre-emptor (0752 601164) – is an intelligent authoring system that records marks and then generates worksheets tailored to the needs of the child. It is available for both BBC Micro and Archimedes.

PIPP – Primary Integrated Project Planner – is a cross-curricular database for primary teachers from CIS.

Customers were able to discuss problems and new products with the 14 exhibitors in a friendly atmosphere. Much interest was shown in Ampsounds' Inspiration, and Computer Concepts had its DTP package Impression hooked up to a high quality 2000 dots per inch PostScript imagesetter by Itek.

Games players were catered for with the first showing of Fireball II, the latest offering from CIS – reviewed in this issue – plus their Minipacks 1 to 4. Minerva were showing off three new games – Maddingly Hall, Talisman and Battletanks.

Also showing from ARXE Systems (01-534 1198 7-8pm only) was the unique Speculator, a Sinclair Spectrum emulator for the Archimedes. Onkar Jagpal of ARXE said: "It may seem silly, but it shows what the Archimedes can do and we're hoping to license games to sell with it. We have tested over 200 and they run faster and better on the 32 bit machine. It also provides an upgrade path from Spectrum to Archimedes.

"More importantly we have a CP/M emulation almost completed which will run all the software from the ageing Amstrad PCW which gives another practical route to the Archimedes for non-BBC Micro users."

So successful was the event that a follow-up Summer Fair is to be held by CIS on June 16 and 17. .

Pin sharp printing

NEC Computer Peripherals (01-993 8111) has produced a replacement for its Pinwriter P2200.

Called the Pinwriter P2 Plus, the new 24-pin dot matrix model costs less but offers enhanced performance and specifications.

Printing at a creditable 192cps in draft and 64cps letter quality, the P2 Plus features a new intermediate speed font, Fast Focus, which gives NLQ at draft speeds. It comes with an increased number of fonts plus improved paper handling facilities including an auto-load feature. Price, £349.

NEC is currently expanding its direct dealer network for printer, monitor and CD-rom products. Formerly the company had 50 direct dealers but this is being expanded to 250.

Micros get message across

TO get their messages across, an increasing number of advertisers opt for the display screens which can be seen in shops, bus stations, arcades and exhibitions throughout the country.

Often the images flashed on multiple monitors leave a lot to be desired, but a new distribution amplifier now promises to put BBC Micros and Archimedes machines at the heart of clear-cut public information systems.

Traditional video images can be degraded when computer graphics are distributed down long lengths of cable.

To solve this problem, Interactive Media (0902 25444) has substituted the RGB (red, green, blue) method so that high resolution screens can retain their clarity and colour detail.

Its new Multidat RGB distribution amplifier allows up to eight monitors to be connected to a single micro, opening up the possibilities for a whole new range of applications including the education field.

Multidat has an output of 0.7v or 1.0v peak to peak into 75 ohms.

The 0.7v output is especially suitable for monitors with a scart input while the 1.0v output covers other applications.

The basic Multidat has four outputs and costs £175 plus £5 carriage while the Multidat Plus offers eight outputs for £300 plus £6 carriage

Scart output leads cost £5 each.

More colour – especially green

AS well as introducing more colour pages *The Micro User* is going green. Future issues will be printed on paper manufactured in a way which is kinder to the environment.

Publisher Database Publications is to use paper made in Scandinavia under the tight ecology rules imposed on mills there.

To reduce tree felling, it comes from the waste offcuts of other wood processes such as furniture-making, also employing a new chemithermomechanical process which makes more economical use of wood than older methods.

Coating of the paper further improves the environment by using slurry from the Cornish china clay industry.

Strict water purification plays an important part in its manufacture and the potentially damaging effects of chlorine bleaching have been eliminated.

The paper comes from wood grown in the forests of Finland and Sweden where meticulous records are kept and trees are grown to maturity faster than they are felled.

"When we decided to move over to paper made by more ecologically sound methods, our problem was to find a quality product which would support Database's improved production technology", said the company's commercial director, David Hirst. "We believe we have now found the right answer.

"This paper cuts down the use of natural resources, eliminates potentially harmful processes, but will allow us to retain the high standards of print and colour reproduction which readers of *The Micro User* have come to expect".

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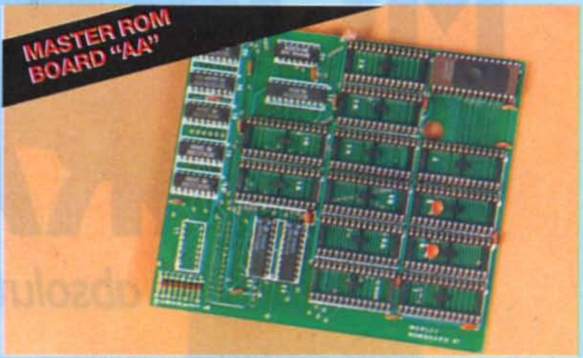

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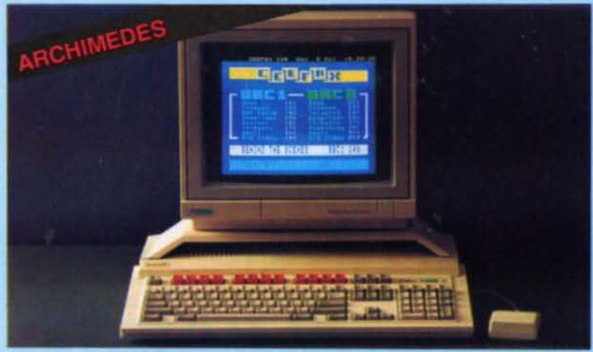

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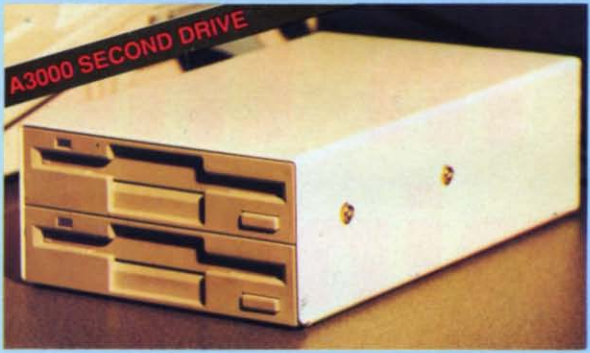

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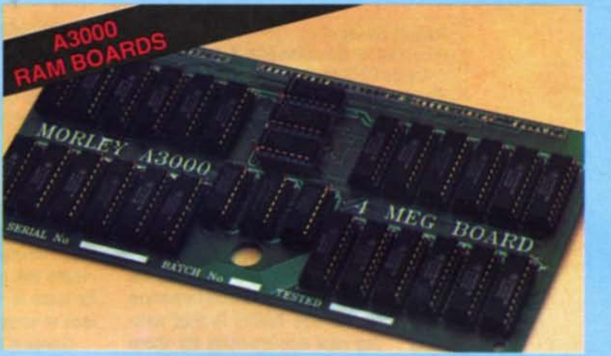

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In the beginning...

Geoff Brown investigates a versatile application generation package

Product: Genesis
Price: £99.99; Education £69.95; Site license £279.80.
Supplier: Software Solutions, Broadway House, 149-151 St Neots Rd., Hardwick, Cambridge CB3 7QJ
Tel: 0954 211760
Requirements: 1Mb Archimedes series or A3000

THE problem with micros as powerful as the Archimedes series and A3000 is that writing new applications for them is a considerable task for the inexperienced. So any program that can make this process easier must be a real boon.

Genesis claims to be such an application. To quote its newsletter it "provides a framework for creating networks of linked pages of information". Anyone familiar with the Ceefax and Oracle teletext systems understands the idea of linked pages – on a news page you will find references to further details on a different one. The system is a network of cross-referenced data.

In this case you, as the user, have to type in the number of the page you want to go to. But imagine the same on your Archimedes screen and, instead of being required to type a number, it just says *Click here for further details.*

At its simplest level that is the service that Genesis provides – allowing you to create this type of data network. There's a lot more to it than that but first let's take a look at what you get in the package.

Genesis comes on two discs in an A5 box with a 96 page manual plus various flyers and promotional material. Apart from the obvious step of backing up your discs Genesis definitely isn't a *load and go* application if you are using a one or two floppy drive machine. Chapter two is devoted to installation and is certainly worth reading even if you have a hard disc as it explains each of the applications.

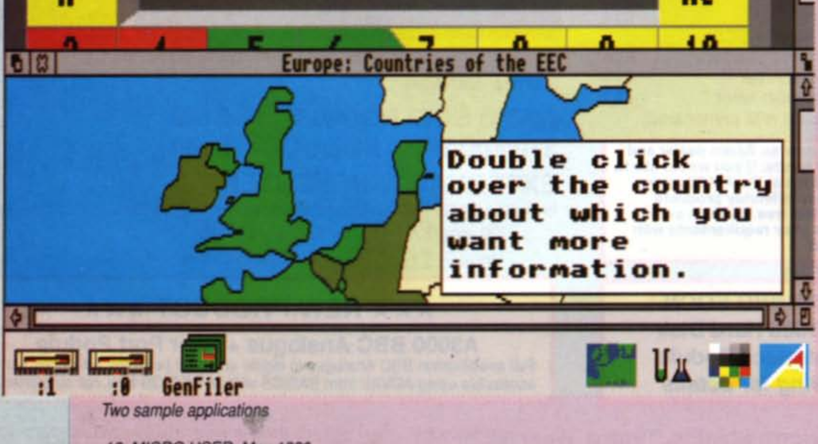
Using the system on a hard disc is very simple. All you need do is create a Genesis directory within your main Applications one and copy everything on both discs into it.

The manual seems clear enough and it's easy to follow through the example given in chapter three of how to create a new application. However, when trying to look up specific points the index was less than useful.

On the main Genesis disc are four applications: !Genesis, !Browser, !GenFiler and !GenLib. The first is the actual creation program, the second allows you to browse through an existing application but not change its structure.

GenFiler is a utility that handles the resources within an application – of which more later – and GenLib contains pre-created items that you can use and where you can put the common items you've created.

Unfortunately all the icons for these are the same apart from their colour which I found quite irritating – as a regular DeskTop user I look at the pictures, not the words – to identify what I want.



Click on the element you are interested in.

Double click over the country about which you want more information.

Two sample applications

On the second disc are several example applications created using Genesis. You have to have either the Browser or Genesis itself loaded to run these.

When the first, called *About Genesis*, is run it brings up a simple page from which you can access others which illustrate various points about the capabilities of the software.

These include the ability to show text which may be the system font – scaled to any size – or an anti-aliased one, Draw files, Sprites – which may be digitised images, Euclid 3D pictures or Mogul animations.

The !Europe application shows the flag of a country, various statistics and, in some cases, will play the national anthem. There's a Table of Elements which from the main – home – window lets you select a specific chemical element and provides some information about it.

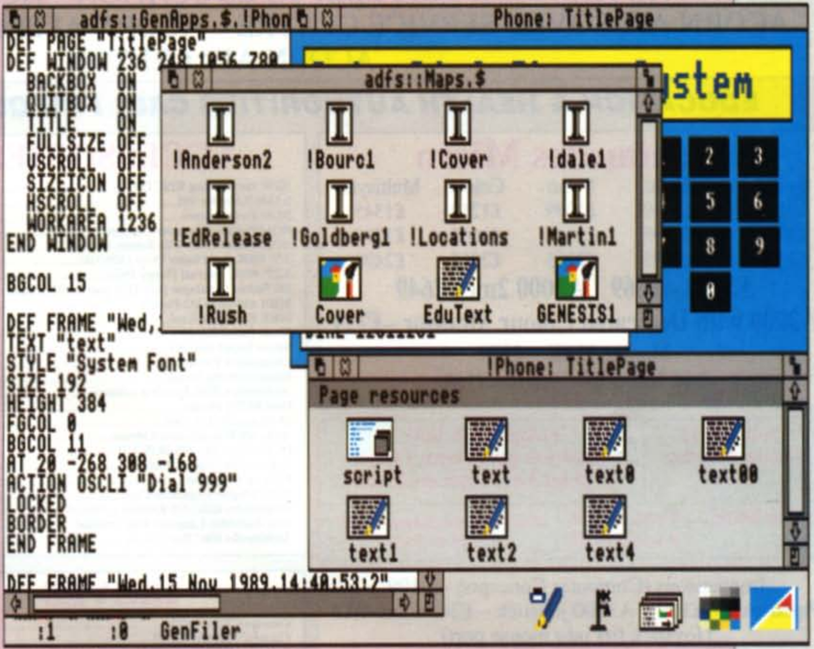
Finally there's a phone directory which illustrates the simple search facility that Genesis possesses, allowing you to use it as a database.

The process of creating a new application is not really one which can be done off

Comparison with BookBinder

In the April issue we reviewed BookBinder by Musbury Consultants which works on a similar principle but without script files or the ability to process different file types. As BookBinder is much simpler it has less options and hence the learning curve is much reduced. However the price difference is quite significant –£55 compared with £99.99.

On this month's subscription disc there is a BookBinder book and next month there will be a Genesis application.



```
DEF PAGE "TitlePage"
DEF WINDOW 236 248 1056 780
  BACKBOX   ON
  QUITBOX   ON
  TITLE     ON
  FULLSIZE  OFF
  VSCROLL   OFF
  SIZEICON  OFF
  HSCROLL   OFF
  WORKAREA  1236
END WINDOW

BGCOL 15

DEF FRAME "Wed,
TEXT "text"
STYLE "System Font"
SIZE 192
HEIGHT 384
FGCOL 0
BGCOL 11
AT 20 -268 308 -168
ACTION OSCLI "Dial 999"
LOCKED
BORDER
END FRAME

DEF FRAME "Wed,15 Nov 1989,14:40:53:2"
```

Script file and resources for the phone book

the top of your head – you have to sit down and plan it out. For instance, is your use a simple linear-style one where the finished product is a database or instructional process with no branches?

Or perhaps a diagnostic system where the user is going to need to choose different paths based on the answer to certain questions – perhaps for finding a fault in a car?

Alternatively you may have a large database – perhaps to do with health – where there are many initial choices leading to a set sequence which may have branches off to other related areas. Good planning is essential.

Once you've decided on your network plan you should create your resources – sprite pictures, draw files, plan the words you want to use. If music is needed the files will need to be created and so on.

It is possible to produce the network skeleton first, of course, and then fit the resources into it afterwards. In a classroom environment different groups can be working to collect various pieces of information that needs to be included with the teacher merely providing the guidance. This sort of activity is perfect for a school with limited computer resources.

To produce a new application you must load !Genesis and then using the icon bar menu select New and save the application icon to a directory viewer. The basic data is saved and the Home window is displayed.

This is the entry point and always appears first. Any text, picture or whatever has to go in a frame so clearly your next step is to create one. Simply click in the window and drag – a box will appear and open up as you move the pointer. This frame can be re-positioned and re-sized at will.

You can place text into the frame by clicking in it, at which point a cursor appears and you can just start typing. From the frame menu you can change the font and size. Any text you type in becomes a separate resource file within your new application.

It is possible to create a different type of frame where the text is actually saved with the definition rather than being a reference to a file. You can drag sprite and draw files on to a frame in order to load them – !GenLib contains many of these.

Pages

You can create a new page either from the icon bar menu or by copying the current page from its menu. This latter method forces any resource files for the original page to become shared – hence saving valuable disc space. Also if the contents of the resource is altered it changes on every page that it appears.

What makes a Genesis page special is the fact that a frame can be made to do things when clicked. The most basic operation is forcing a new page to appear. To do this you must create a link – this is very simple and only requires dragging the link icon from the frame menu to the new page.

Pages can also have backdrops which can be sprites or draw files. These don't do anything apart from look pretty although they could be used to provide the basic page layout. One interesting feature of the whole Genesis system is that each page and frame is actually held as a Script file which is in fact just Ascii text.

This means you could load it into !Edit and alter it, or even just start from scratch.

Many other file actions can be incorporated into a frame, including running Basic programs, loading and executing other applications and so on.

It's even possible to link the frame from one Genesis application to the page of another. It's this kind of versatility that makes Genesis the excellent program that it most certainly is.

However, Genesis is not completely without fault: The Mogul animations run very slowly.

I thought initially that this was because I was using Mode 12 and Mogul itself runs better in Mode 15 – but after changing mode it was even slower.

Given the sophistication of the script files I was disappointed in the lack of variable storage, calculations and conditionals such as IF...THEN. While I realise this would increase the size and, possibly, slow the operation of the program, its lack makes the creation of really sophisticated applications impossible.

Interestingly the appearance of Genesis coincides with Acorn's release, in conjunction with NeXt Technology, of the CD-Rom player and its filing system – the CDFS. A CD-Rom is ideal for storing images in the form of sprites or draw files, or music and any other type of file though in a non-modifiable format. This means that a fixed application generator such as Genesis fits into the CD-Rom structure pefectly as that is exactly the type of resource storage it needs.

Genesis is an impressive product that is certainly here to stay.

Summing up

A piece of software specifically written for a certain task will always be superior to a Genesis application doing the same thing. But this ignores the fact that Genesis is very easy to use and even the uninitiated will soon get the hang of it – and you don't need to be a programmer. Genesis conforms to Acorn's user-interface standards and is a proper multi-tasking application.

Genesis may be a jack-of-all-trades but it can master many.

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UPDATE

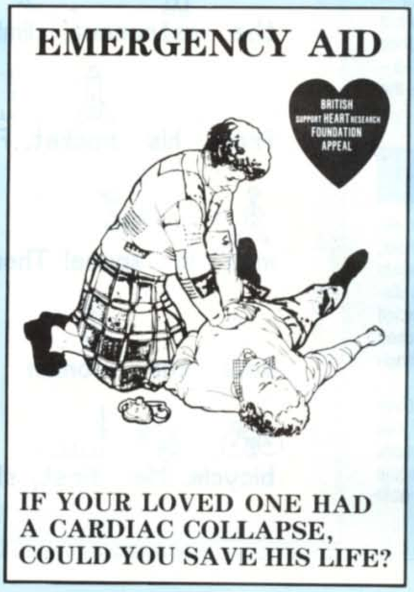
Successful loans

THE loan scheme launched by Sherston Software (0666 840433) in January has proved a huge success, with well over 200 advisory teachers registered under it.

Using the service, Advisory teachers can borrow up to 10 Sherston titles for a term with the option to buy them at 50 per cent discount for demonstration purposes. It is also possible to borrow 10 copies of up to five titles for 21 days to allow them to be used on courses.

The most recent package that can be viewed as part of the scheme is The Concept Kids, a primary introduction software package designed specifically for the Concept Keyboard. It was commissioned by Star Microterminals and is claimed to fulfill the original brief for an engrossing and simulating series of problem solving exercises which demonstrate the keyboard to the full.

The Concept keyboard is now available from AB Micro Express (0222 733485) with either the original introductory software or the new Sherston replacement. The A3 size costs £145.50 and the A4 size is £119.50. The Concept Kids is available alone from Sherston. Price £22.


EMERGENCY AID

IF YOUR LOVED ONE HAD A CARDIAC COLLAPSE, COULD YOU SAVE HIS LIFE?

Mini BETT shows

FOR people who couldn't get to the BETT show or who couldn't face the crush of BETT, LTS (0386 792617) organised a series of three local shows sponsored by the DTI. At Bristol, Oldham and Birmingham, the shows were held during February and March.

With over 40 exhibitors at each event and a predominance of Acorn machines they were an ideal chance to view the latest software for 8 and 32 bit BBC Micros.

"I suggested the shows to the DTI, who didn't need much persuading", organiser Michael Trot, told *The Micro User* at the Oldham show.

Many of the big names in the world of education software were at the shows, Including Sherston, Longman Logotron, AVP, Clare's Micro Supplies and Dabs (David Atherton Books and Software) Press. Most of the software had already been on view at BETT, but among the new releases either available or announced at the show were several from Clare's including Tempest, the DTP package, Classmate, a primary word processor, a yet unnamed Risc OS music program and Illusionist – a package with similar features to Euclid but with enhanced texture mapping and a built-in animation language.

Also coming soon is Primary Healthdata, a version of the Healthdata database designed for 9 to 12 year olds.

The show organisers demonstrated Discover, a text disclosure program for the Archimedes/A3000.

Designed for use in English and European Languages, pupils have to discover the text that has been coded by characters chosen by the Passage Author.

The software is fully Risc OS compatible and is claimed to allow multiple views and windows on a document, support multi-tasking and multiple documents and give a choice of print speeds.

Discover costs £25 for a single copy or, for an extra £20 a site network licence is available.

Helping to save a life

THE February 1987 issue of *The Micro User* featured a package designed to teach emergency first aid. Inspired by the response to that feature, the author, Dr Peter Burridge, has continued to upgrade it and has now released a full resource pack for teachers.

The product has been launched by Screen Teach (0706 525021) and together with an upgraded version of the original software on flippy 40/80 disc the package contains a VHS video by the British Heart Foundation, the How to Save a Life book, the Resuscitation for the Citizen and Beating Heart Disease booklets and several other leaflets and useful contacts for other related material.

"The response to the original feature was far greater than I expected", Dr Burridge told *The Micro User*, "so I have continued to upgrade the product.

"However, people who bought the original disc for £3 should upgrade it to a new one as there have been slight changes in recommended methods.

"I will upgrade for £6 if the discs are returned. However, if people prefer to upgrade to a complete package I will refund the £3.

"It is also important to note that the Resuscitation for the Citizen booklet referred to in the original feature has been revised and the second edition also conforms to the 1989 guidelines prepared by the Basic Life Support Working Group of the Resuscitation Council of the UK. This version is supplied in the package".

A recommended source of information are the Save-a-Life programs that will be broadcast by the BBC starting on April 30 and repeated from May 7.

The package costs £25 and a £5 donation will be made to the British Heart Foundation for each one sold.

Dongle deleted

RESPONDING to the concern of some schools that dongles may be stolen, Computer Concepts (0442 63933) have released a non-dongled network version of Impression.

The new version will be licensed to each school and will only run on their network – it will not run on other networks or on a non-networked machine.

Under the existing licence arrangement schools pay £477 for the licence and then £15 for each dongle. They can now opt to pay £700 for a network licence. Dongles for machines not on the network and upgrades from the dongled licence scheme are also available.

"We thought that educational establishments had a legitimate worry about theft", Charles Moir, founder of Computer Concepts, told *The Micro User*, "but the vast majority of individual users are not concerned about the dongle and are unlikely to have it stolen.

"We will, therefore, continue to sell the normal version of Impression complete with a dongle".

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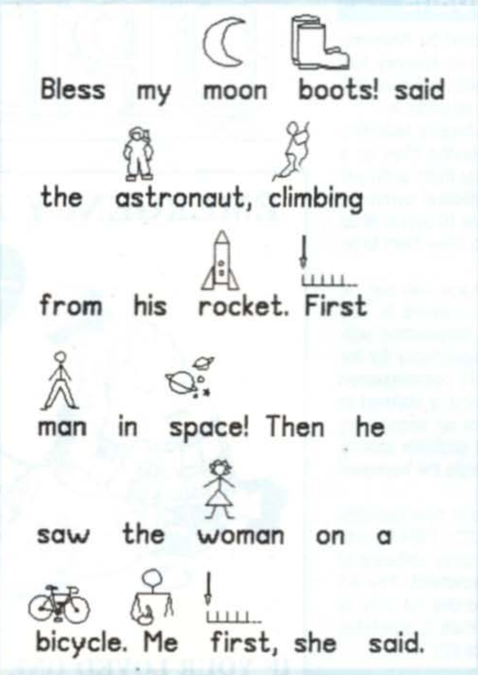
Reforms in text

A STAND-ALONE text of the Education Reform Act for the Longman Logotron (0223 323656) product Hyperbook – reviewed in the April issue of *The Micro User* – has now been released. The price of the Hyperbook Reader software is £49 – not £45 as quoted in the review – while the authoring system is available for £15.

Master plans

A DONATION of £800 towards a workstation for Ryles Park County High School, Macclesfield has been made by Effluents Services (0625 296666), a local waste disposal company. The school plans to install 10 Masters in the suite which will be used for teaching basic skills in control technology and computer aided design.

Effluents Services told *The Micro User* that it is impressed with the way Ryles Park is looking towards the needs of pupils by providing a technology centre to equip school leavers with valuable skills for both a job in industry or further education.



Bless my moon boots! said
the astronaut, climbing
from his rocket. First
man in space! Then he
saw the woman on a
bicycle. Me first, she said.

FROM Pictures to Words is claimed to relate in many ways to English in the National Curriculum Levels 1 to 3. The suite of language development and literacy activities for children in primary schools or with special educational needs is produced by Widget Software (0707 264780).

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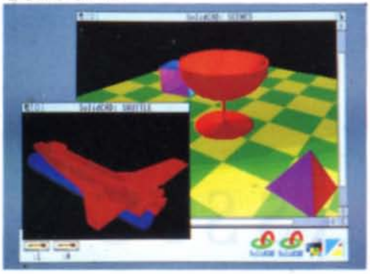

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- RISC USER August 1989.

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"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

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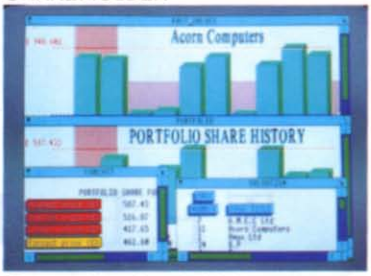

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Bradwell Village School meets an alien

PART ONE

Marshal Anderson reports on a close encounter of the educational kind

THE adventure began when some of our fourth years – middle school – logged on to our electronic mail service. To be honest, we had made very little use of it over the past two years and kept it going basically because Sherston Software had put some money towards it.

These particular children were having their first taste of electronic mail and were writing a letter to Sherston to thank them for their help.

To everyone's surprise there was a message in the mail box waiting for us. My first assumption was that it would be one of those dull county circulars that we get from time to time that actually concern secondary schools, we still being among the few primaries with Email in the county.

After sending our letter it seemed a good opportunity to show the children how to download the message on to disc so it could be read later – watching the phone bill, you see. None of us expected this:

```
Help! Who are you? What year is
this? Is there anybody there who
can help us? There are two of us
here, Jason DeVere and Emelda
Grant. We do not know what has
happened. We seem to be lost. Is
there anybody who can receive this
message, please answer. Who are
you? Where are you? What year is
this? God save the King!
```

There seemed no reason not to respond so they went ahead. Their message was short. The children introduced themselves as Mrs Kennington's class and informed the senders of the year that we have a Queen these days. The message that came back caused quite a stir. Jason and Emelda, erroneously addressing their letter to Mistress Kenningtons-Class claimed to be from Evesham – which tallied with their mailbox heading – in A.D. 1649 – which didn't.

They seemed to have little idea about where or indeed who they were, except that it had something to do with Zorg and that things were definitely not as they should be. What they needed were some terms of reference to get their memories back, and could Mrs Kenningtons-Class help by telling them the sort of clothes they would be wearing?

Jan Kennington, their class teacher, was quite happy to make this part of the class work and so off they went to the school library. Jason, apparently, would be dressed in ruffs and plumes and Emelda in ringlets and frilly dresses.

Jason thought this fine, but Emelda was disgusted at such opulence.

They also filled us in a little about how things had started: It seems that Zorg had instructed them separately to go to the churchyard in Emberly Castle. Here they met for the first time where they had touched the gnomon on the sundial.

We soon got the answers when a message arrived from Zorg. An important, powerful creature speaking exclusively in capitals.

He/she/it informed us that Jason and Emelda were bringing an article of great power but, as both had touched it at once, the transporter calculations were upset. Coordinates were being calculated to bring them the extra 300 years to Zorg's time and we were to leave them alone.

The next message from Jason and Emelda seemed very urgent. They asked us not to believe Zorg and enclosed a host of questions about their 17th century lives.

While filling in a lot of background knowledge, the class also managed to sort out, using maps and guide books, that the church they had vanished from was probably St Mary's. At the same time they

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worked out that Jason was a royalist, Emelda a puritan – hence their different reactions to the clothes. Our children also pointed out that they were a group not a hyphenated Kennington.

However, to hedge their bets they also wrote to Zorg to find out what the object was and just what would befall who if they continued to help the lost pair.

Paranoia set in about now as Jason and Emelda, concerned that Zorg was intercepting their messages, started to encode many of them as well as being extremely cryptic about the solutions to the codes.

As an added measure they suggested we use a password which locked the messages against prying eyes. The password was also hidden in a riddle.

Zorg now tried a different tack – Jason and Emelda were just silly children playing a joke, we were to ignore them and run along and play.

This caused quite a cavalier reaction from the fourth year of Bradwell Village. Our buildings insurance didn't quite cover us for Acts of Zorg, but they wouldn't listen.

Pin-pointing Jason and Emelda's disappearance then became the task. Having found the place, the time was narrowed down by the fact that Charles was still alive when they left. After that they went on to identifying Jason and Emelda's parents names from clues they could remember.

By now theories were developing about how this had all come about. Zorg was seen as bluffing, no one believing in his powers. But how had the children been transported?

The explanation our fourth year came up with was that in that geographical area there had been several important battles and events that changed history. Somehow, these events were so strong that they had caused a vortex or time warp, trapping the children or allowing Zorg to kidnap them.

Meanwhile things were speeding up. Having found out that Jason's mother's name was the same as the King's wife's the search was on for Emelda's father's name.

This stretched our school reference library to its limit and no one could find out who had written New Atlantis. On top of that, Zorg had changed tack again. Now he was demonstrating his power by coming up with some obscure personal details about the children in the class.

At a loss to know how Zorg could know this, they became more determined rather than worried. By this time Jason had enough of his memory back to return home but Emelda still had a problem. Zorg seemed to be involved in this and they needed to cut his power finally.

They discovered that transmitting Zorg's first name would give them the break they needed and this arrived heavily coded. The code was cracked and the final message sent:

```
Dear Zorg, or should we say
AMNESIA!!!! HA-HA!
Thought you could beat us eh? Well
eat this! Jason and Emelda are
home!! We think you've lost your
mind so we're sending over a
sledge hammer to knock it back
in!!! WOOF! Sorry Zorgie Baby, but
we've won and you've lost!
Lots of love (shove off) Paul,
Tim, Liam and everyone else in Mrs
Kennington's class.
```

And we never heard from any of them again.

The children experienced a warm glow of satisfaction – while in the staff room we wondered at the chain of events that had a group of 12-year-olds burying themselves in history books for half a term.

● *Next month Marshall Anderson reveals the secrets of using Email for class projects and online adventures.*

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CO-PROCESSORS PAPER

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Barnstaple, Devon.
EX32 9AQ
Tel. 0271 45566
Email 01:YNK045

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Price: £29.00
Supplier: 4Mation Educational Resources,
Linden lea, Rock Park, Barnstaple,
Devon EX32 9AQ.
Tel: 0271 45566
Requirements: Archimedes or BBC A3000

Crafty in parts

Rog Frost takes you on a tour of two newly opened Craftshops

Craftshop demos

On this months' 3.5in subscription disc you will find demos of Craftshop. For details of how to receive the disc, see Page 129.

SLOWLY but surely educational software packages are beginning to appear which exploit the power of the Archimedes series. It comes as no surprise to find 4Mation leading in this field, after all, the company has an enviable reputation for drawing the most out of the 8 bit BBC Micro.

The first task on accessing either disc via the DeskTop is to initialise it. This enables you to prepare your own start-up message and is a once-only option. Make sure that you get the message you require, as it really can't be edited. Once initialised, the contents of the disc may be copied to another floppy or hard disc.

Each package contains two entirely separate programs. For Craftshop 1 these are Patterns and Stitching. The former provides 20 basic shapes and the means to alter their size or rotation.

They can be placed together to make a picture in an editing window using 16 different colours, the outline of a shape can have a different colour from the in-fill and all colours can be selected from a huge palette.

A very useful feature is the ability to move new shapes to the back. This makes it possible to construct pictures starting with top detail rather than always having to begin with the background.

A picture created in the editing window can be precisely placed in the whole drawing screen. This is treated as one object and can easily be lifted and placed elsewhere. A simple menu scheme allows block operations and sections of the screen can be marked for clearing, copying or rotating.

A really clever feature is the ability to try out and grab a palette from another screen. Effects can be created which vary from the loud and garish to very subtle.

Printing is via the DeskTop and can be to any printer for which you have a suitable driver – you get ones for most Epson dot matrix and Integrex colour printers with your machine. Although I've yet to see drivers for Epson colour compatibles.

I can commend Patterns to teachers who are seeking a more structured drawing environment than that offered by a standard art package.

Stitching, the other program on disc one, merges the areas of art and mathematics by allowing you to investigate curve stitch patterns.

The mechanism for creating these is to select a basic design from those offered. Simple ones consist of a pair of lines with threads joining them and more complex designs are made up of points on the circumference of a circle which are joined.

These basic designs can be modified by altering the size, numbers of threads and orientation of the pattern. Different colours may also be selected. Having achieved the desired result with one selection, more stitch patterns may be used until the whole screen has the required picture.

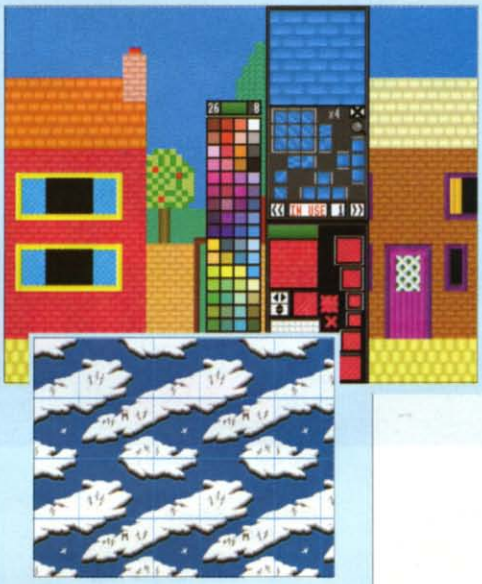
Then comes the clever bit where the power of the micro is really used. The whole screen can be rotated around the centre line to produce a wonderful three dimensional effect. It is worth experimenting with some of the supplied patterns to see just what can be achieved.

Disc two starts off with a program called Embroider which allows you to create complex stitch patterns in a small editing area and use them to produce striking whole screen effects.

This program seems to have been designed with users in mind. It is very simple to get into and you will have the satisfaction of obtaining quick results.

The colour effects are superb. You may select from a range of 64 but each stitch shows light and shading. Having completed patterns, you can change the colours either globally or in a prescribed area.

Disc two continues with a tiling program. For teachers familiar with the 8 bit BBC Micro, this will probably be the hardest one to get into, as it has no built-in colouring capability – instead, it relies on Risc OS !Paint. You can create a tessellating tile layout which can then have a painted sprite placed on it. It takes some getting used to, but children, no doubt, will soon cope with the pixel editing facilities offered.



Typical screens from Embroidery and Tiling

Embroider is likely to be compared with the old favourite Mosaic, but really there is no comparison as the older program allows for only rectangular tiles and eight colours.

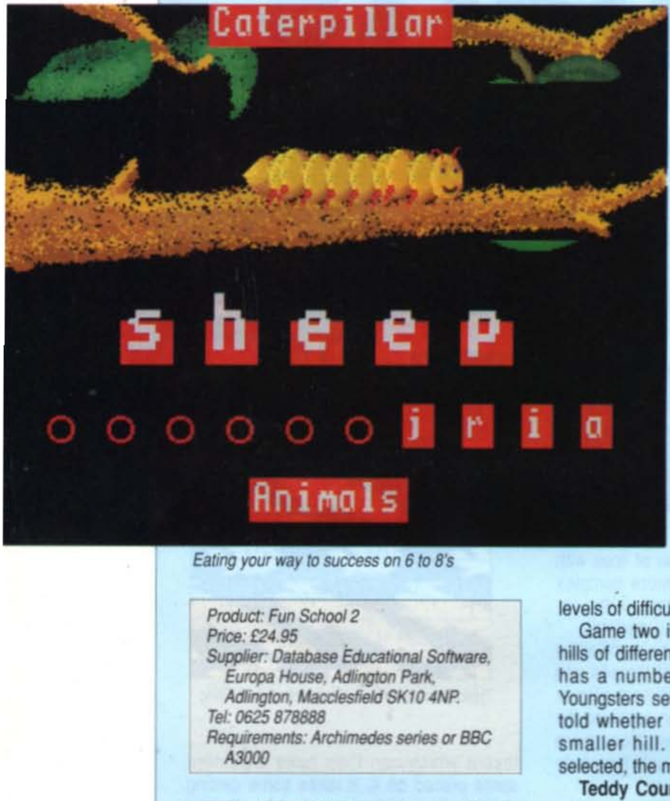
The new one has the full Archimedes range of colours, a multitude of possible shapes, plus incredible speed at the drawing stage. It is worth persevering with this piece of software: The results justify the time spent on it.

This review would not be complete without mention of the manuals. Not only are they produced using Archimedes software, they are first rate in content and presentation – and they're printed on re-cycled paper.

Summing up

Full marks all round to 4Mation for maintaining its high standards. Teachers can buy these programs with the confidence that they are thoroughly worthwhile. I look forward to seeing future Archimedes programs from the 4Mation team.

Graphics that grab



Eating your way to success on 6 to 8's

Rog Frost takes a close look at an Archimedes conversion

Product: Fun School 2
Price: £24.95
Supplier: Database Educational Software, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.
Tel: 0625 878888
Requirements: Archimedes series or BBC A3000

MANY parents and teachers will already be familiar with the Fun School 2 programs on the 8 bit BBC Micro (reviewed in *The Micro User* April 1989). Now Database Software, tempted by the growing number of A3000s in primary schools and homes, has produced versions of this educational software for the Archimedes series.

Three separate sets of programs are designed for different age ranges. The Under 6 disc features a large, cuddly looking Teddy. Programs for 6 to 8 year olds feature a frog, while the Over 8 package makes use of a robot character.

Children seemed to associate this robot with boys and girls may feel that the Over 8 programs are not for them. Apart from featuring these creatures as sprites within the programs, each pack comes with an appropriate badge.

The Under 6 pack contains eight programs on one disc. The first is **Shape Snap** where the items to be matched can be basic shapes on level one through to upper and lowercase letters on the highest levels of difficulty.

Game two is **Find the Mole**: Five mole hills of different sizes are shown. Each hill has a number appropriate to its size. Youngsters select a number and are then told whether the mole is in a bigger or smaller hill. When the correct hill is selected, the mole appears.

Teddy Count involves counting teddies which dance around the screen. If the guess is wrong, the teddies line up for a second chance.

Write a Letter allows youngsters to use the screen to display large letters on the screen in a variety of colours. Text can easily be printed or the whole screen – like all Fun School screens – can be saved at the press of a key for loading into !Paint where the colours could be changed or the picture printed.

The program **Colour Train** features a steam train travelling around a circuit. You must stop it at the station which is the same colour as the engine. Just one key – or mouse button – is needed to operate this game.

Pick a Letter allows children to collect a letter from an entire alphabet to match the one already displayed. At higher levels simple words are displayed. These must be built up by collecting the required letters.

Spell a Word displays pictures of a very high quality and you must type in the word that describes the picture.

The final game is **Teddy Bear Picnic** which involves steering said bear through a woodland maze to the picnic site. This involves skills of coordination, but its chief value comes from the language used by a child and the supervising adult.

The notes which accompany this software go to lengths to explain that children will benefit more from the programs if an adult encourages them through the tasks.

There are also eight programs on the disc for 6 to 8 year olds. These include a version of the **Colour Train** program but with the addition of simple arithmetic and a **Shopping** program where you must match the required purchase to the appropriate shop.

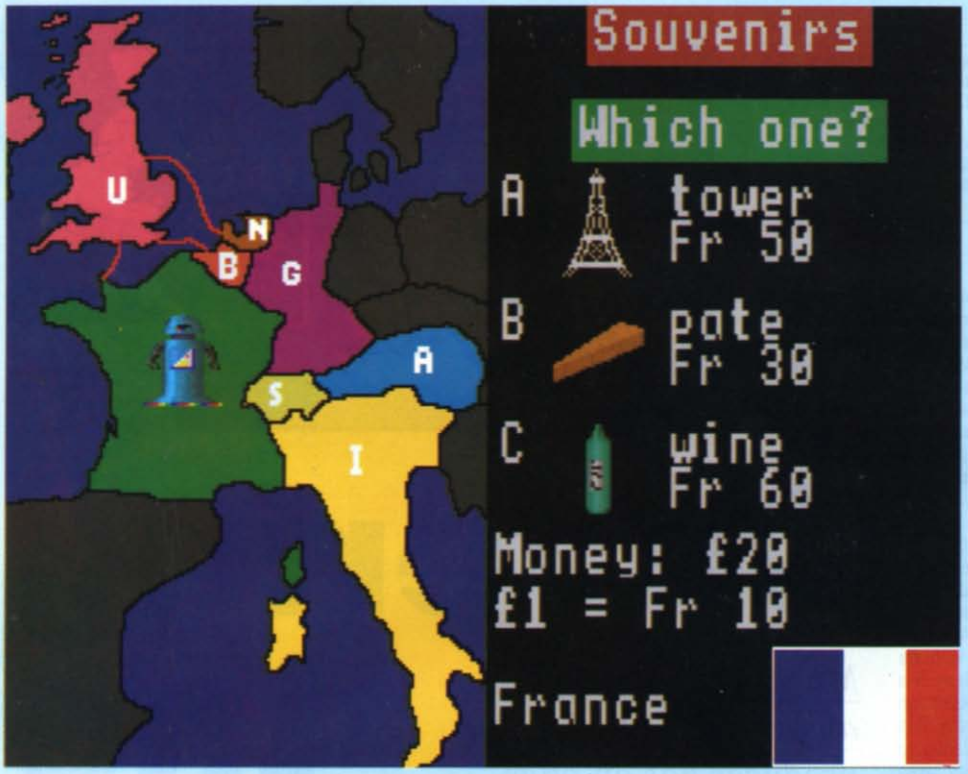
Next comes a **Maths Maze** where the frog sprite has to pass guards who ask arithmetical questions.

Treasure Hunt involves buried treasure on an island – grid coordinates are entered and advice is given of the getting warmer type.

Bounce involves throwing a ball so that it hits an apple. It sounds simple, but obstructions are put in the way and the ball has to be thrown to bounce off a number of them if the target is to be reached.

In the **Packing** program youngsters need to select and place shapes which can fit together to make rectangles.

Caterpillar is a graphically brilliant version of Hangman – with the reward for success not failure – and **Number Jump** involves steering the frog over a lily pond using leaves which display multiples of a pre-defined number. This is good tables practice, and fun too.The Over 8 software



Souvenirs

Which one?

A tower Fr 50

B pate Fr 30

C wine Fr 60

Money: £20

£1 = Fr 10

France

A testing puzzle in mathematics and geography for the over 8's

involves two discs. Some teachers will find the booting of this arrangement a bit of a problem, since both discs must be inserted and clicked from the DeskTop before the software will run.

Once again there are eight programs, but this time there is a bit of a sequence since the last program requires keywords given in the others.

Build a Bridge requires these older children to complete a bridge by selecting and placing the appropriate missing sections.

Passage of Guardians involves steering a robot past guardians who set anagram puzzles. **Unicorn** is a version of the old problem of the farmer, chicken, dog and corn. All have to be moved, but some items must not be left unsupervised with others.

Logic Doors is a maze game where different coloured keys must be carried to open doors. Mapping skills are needed here.

Souvenirs involves a tour of Western Europe in search of presents. You have limited money and need to cope with exchange rates.

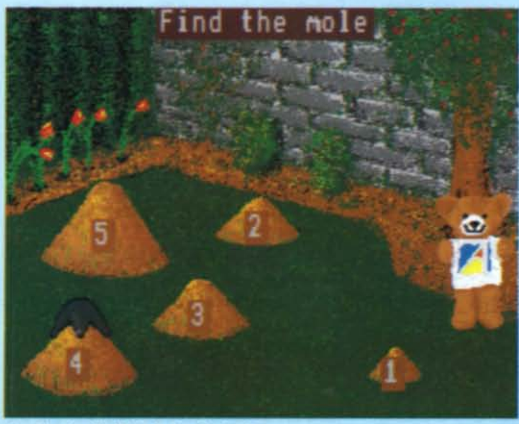
Code Box introduces the concept of binary numbers, while in **Mystery Machine** a heavily-coded message must be sorted so that the machine can be operated correctly.

The final program, **Escape**, is similar to Logic Doors but uses keywords gained from the previous programs.

Having knowledge of the 8 bit versions just does not prepare you for what to expect when you boot up these new versions.

The authors have gone to town with the graphic quality. This, at times, seems almost photographically good.

Some of the sound effects have also been enlivened, particularly the chuff of the train as it circles the track in a couple of the games.



Looking for Mr. Mole in the Under 6's

Not all of the programming is perfect, however. My niggles concern the precision needed at times.

The mouse routines are hard to manage – you move a pointer and the appropriate sprite follows along behind. A small movement of the mouse can lead to real problems in accessing the next part of the program.

The keyboard option also has imperfections, since the keys auto-repeat. This sometimes makes it hard to position some of the movable sprites with accuracy.

The worse problems are reserved for the supervising adult who tries to change the difficulty level. A short stab of a key seems to produce no effect at once and then suddenly levels of difficulty flash past you.

This problem can also occur when trying to select programs. Selecting them by number is a safer procedure than using the arrow keys.

Summing up

If you are looking for bright pieces of learning software to use with young children give Fun School 2 a try as its lively graphics can certainly hold attention. Education *experts* probably won't like the programs since they involve rather closed activities, but children, on the other hand, thoroughly enjoy them.

Products & Prices: Ampleforth Plotter £15, Transformation £15, Calcism £13, Scalebook £12, Page Designer £25, Britain £12, Number Investigations £15, Rivers £12 (mail order only)
Supplier: Himap Educational Software, 8 Wishart Road, Kidbrook, London SE3 8PP.

Highly detailed maps from Britain

Covering the

Marshal Anderson takes an overview at what one producer has on offer

HIMAP has produced a wodge of software for the secondary school market that ranges widely across the curriculum covering maths, humanities and music, giving in some of these areas short but useful packages with specific and very well defined aims and objectives.

In **Calcism** a calculator keyboard is displayed on the screen and accessed by the computer keyboard. All the standard functions are available with the important addition of a display that records up to 12 key presses. This makes it possible to follow the steps taken in any given calculation with all stages and intermediate results displayed.

Most impressive is the way any bracketed part of the calculation is resolved immediately and the result of the contents of the brackets displayed. This should be a great help in demonstrating the effect brackets have on groups of numbers and the way they interact.

The calculator has a memory key and its contents are permanently displayed so that they can be brought with confidence into calculation. Along with this are trigonometrical keys and a range of other functions including logarithms, exponents, squares and raising by a power.

All in all a very useful tool at the lower end of the secondary maths curriculum – with the usual rider that other areas of education are bound to find uses for it.

Transformations is a kind of electronic blackboard program that demonstrates geometric transformations. The screen presents a grid on which to draw a shape. This may be done by entering co-ordinates or by moving an arrow around the screen and quite complex shapes can be generated. Having drawn your figure your chosen transformation is carried out.

This part of the program is very good. The shape is animated as it moves across the screen and the new shape is drawn, in reflection the shape actually turns itself over, which is very effective.

The transformations available are reflection, rotation, translation, enlargement, shear, stretch and matrix and all are shown clearly and simply. The program allows you, having shown an object transformed in one way, to move to a different transformation and see the effect on the same object. You can also dump the screen to an Epson-compatible printer.

This useful program can provide a dynamic introduction to what can be a complex subject for many students. Documentation is fair, but some of the package's facilities are rather well hidden by the language used.

The **Ambleforth Plotter** uses an almost identical screen layout to the Transformation program, again aiming for an electronic blackboard presentation with a square grid centred on 0,0.

Changes are available from the opening menu and you can easily move the origin of the graph from the centre to the bottom left-hand corner of the display. You can also select the scales of the x and y axes and these may be expressions.

Once you have the display you want you can enter points on the graph as coordinates or expressions, or activate a pointer that can be used to highlight part of the screen, but most likely you will want to plot a graph.

The range of options is huge, offering Cartesian graphs, a graph of the gradient function, parametric equations, polar and intrinsic coordinates and differential equations with all manner of options in each. Simply enter the expression/equation you want and watch it happen on the screen.

There is a printout option and it seems that this package, more than the Transformations program, might be used experimentally by students in groups, as it can be used at quite a simple level.

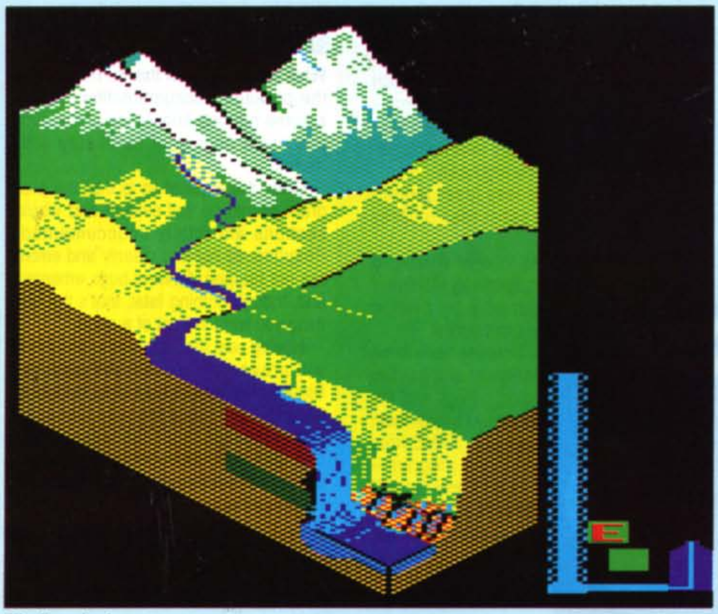
Number investigations gives a variety of programs examining the behaviour of numbers. This is very much in keeping with current thinking in maths education, and links directly with the National Curriculum.

There are five investigations on the disc. The first looks at repeated operations where a base number has its digits squared and summed, the same process then being carried out on the result.

Students then have to find *happy* numbers – those that produce a stable result after being put through this procedure rather than entering an endless loop. Eventually, by using the various options students may discover that each *sad* number ends up in a loop containing the same numbers.

The second investigation looks at *perfect* and *amicable* numbers, which involves summing the factors of a given number to see if they reproduce the starting number – perfect – or if the sum of the factors of the sum of the factors produces the starting number – amicable.

This seemed a little dry, as there are so few of these types of numbers in a given range. However, the manual suggests ways in which the principle may be extended, and this is one of the ways in which a micro can help in the investigation of numbers – to do thousands of calculations for students so that they can get on with the thinking. Fibonacci numbers figure



The flow of a river

curriculum

much in maths investigation, and various tools are presented here to experiment with the series. Students can see an explanation of the series and an illustration of the *Golden Section* as well as being able to create their own series.

There is a short experiment examining the use of a repeated number rule: If the number is even divide by two, if it is odd multiply by three and add one, the result always arrives at one.

This sort of thing can provide an excellent launching point for a wider investigation, letting the machine do the boring bit.

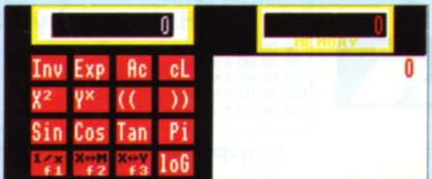
The final investigation looks at Fermet's work on square numbers, again letting the micro crunch the numbers for you.

All these investigations are backed by concise teaching notes and many suggestions for further work. This package should give plenty of inspiration in this area of maths and launch users into other investigations.

Scalebook is a music utility. There are options to set pitch, octave, speed and volume before you proceed to the main program.

Here you can set five different scales, choosing any key and then major, melodic minor or harmonic minor. The program produces a series of staves on screen and plays the scales while writing the notes on them. Having seen one scale you can repeat it or select the next.

This seems to be a very limited program. You have to enter five scales before it will play, so using it for a quick illustration is difficult. Quite what other use it would have is hard to see – you couldn't use it in a room full of machines.



TAP SPACE TO WIPE.

Easy to use calculator

What is one supposed to do with the note played? Sing it back perhaps? As a rote learning device for scales it might have some value, but surely there are better ways than watching notes drawn on a screen.

Britain is a geographical package that divides into four sections. Search shows an impressive map of the UK and then offers you a choice of Topics. Choose from a list including *hills*, *rivers*, *gas* and *general*. What you get is a flashing asterisk on the map and a name. The first that appears under *gas* is Glasgow. What kind of geographical features are listed under *general* then? Salisbury Plain, John O'Groats, North Forland... you get the idea.

You can opt for free choice and type in anything you like, but the chances are you will get *Sorry, not listed* if you seek the M1 or Milton Keynes or Southend. The good citizens of Corby would be wryly amused to find themselves listed under *steel* as production stopped there in 1980.

The Test section gives the same map and topics. The asterisk flashes and you have to guess the letters that make up the place name. The asterisk, for instance, flashes over Liverpool; the answer is Partington.

Resources lets you select again from a list. The geographical feature is then overlayed with shading to show, for instance, that the Scots have a real thing about sheep but there are no cattle in Buckinghamshire. It produces a good motorway map.

There is also an option to set up your own test by choosing the locations that will be bleeped at by the asterisk.

The information in this program is at best simplistic, at worst simply wrong. The approach is deterministic, that is it implies that everyone in Corby makes steel; plainly they don't. The child is presented with information in an almost unconnected form.

This kind of learning is time consuming, inefficient and above all boring. This is the kind of software that gives educational computing a bad name.

Rivers is another geographical package and divides thus: Revise gives you a few pages of text and illustrations on the youthful-mature-senile model of a river.

Once again we see geographical concepts presented in a way that many now think discredited. However, as models go this isn't a bad one, though it is usually hard to find a river that develops in exactly this way.

The Test section is straightforward multiple choice based on the river model. There is an option for making your own tests in the package and many may find this useful.

Then there are two games. Both ask you to identify parts of the river model on excellent graphics of the upper and lower river.

Unfortunately the games have a patronising sub-space invaders style, unlikely to appeal to the age of student tackling this subject

And they are so badly written that hitting the right answer even if you know it can be difficult, as the program responds

➤

➤

so slowly to a keypress.

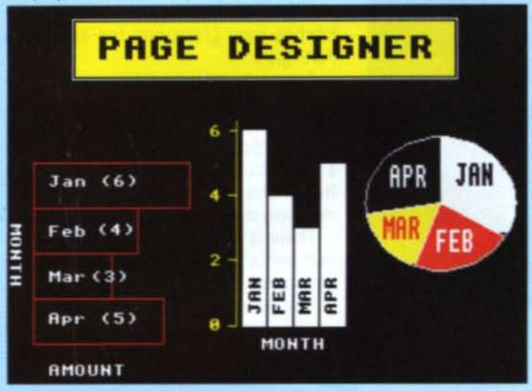
Page Designer is a simple design program for producing page layouts. It is the sort of thing students might use to produce reports of projects and is very timely inasmuch as the National Curriculum makes a lot of using Information Technology for communication.

The program offers three sizes of text running vertically or horizontally and can display information as pie, column and bar charts. There are simple tools for producing lines, boxes and circles and any shape can be filled.

The design screen is in Mode 1, which gives four colours to play with, and – although it takes a little getting used to – the package has its own internal logic. Satisfying results can be produced.

The screen dump is very good, producing truly round circles rather than squashy ones.

The program seems to write directly to the screen, so once something is fixed it can only be rubbed out, not edited.



Simple but satisfying layouts from Page Designer

Screens have to be designed and printed out in one go and the only way to save them is to use *SAVE from within the program – and similarly *LOAD them.

It's certainly easier than using a desktop publishing package like Pixel Perfect, but it doesn't give the flexibility or quality of output. It might be more constructive to compare it the graphics section of an integrated package like Mini Office II or Inter Chart.

Indeed, Mini Office II will give you an entire integrated package for about the same price as Page Designer.

Summing up

What a mixed bunch this is. Throughout the package's documentation tend to assume not only knowledge of the subject but a degree of familiarity with micros.

Often the implication is that the program should be self-evident and whole sections are totally undocumented. Programs do not end cleanly and errors are not trapped. Several bugs emerged and, though nothing fatal, that's the last thing you want in front of a class.

Having said that, the maths programs will prove very useful and perhaps Himap could look to their documentation generally and see if there isn't room for improvement. It might also widen its test bed, give their packages to a few inexperienced teachers to look at and see how they react

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Michael Noels finds the news flooding in on his hotline

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TO you recall those far off Saturday afternoons of black and white Grandstand? Remember how those football results used to rattle off? Or the films with newsrooms full of chattering teletype machines?

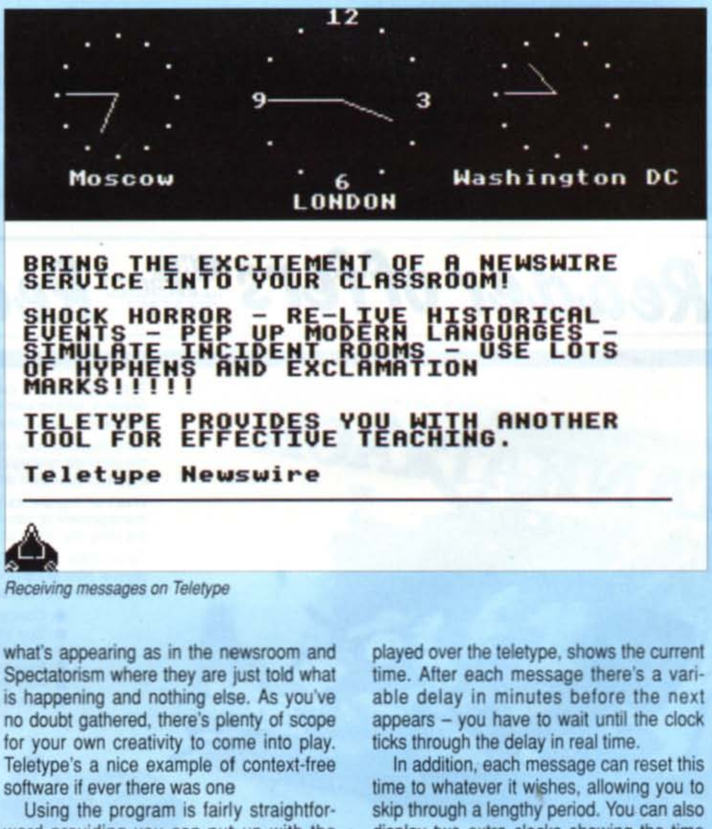
Well Sherston Software has brought it all back in a highly educational environment with Teletype. The basic idea is simple: The program simulates a newsroom's teletype, printing messages out line by line on the screen. The messages come in over a period so Teletype can mimic a *running story* as later messages add details to the earlier one. And of course, you could have several stories running at once.

Essentially that's all there is to it: A neat printer head rattles across the screen displaying a sequence of messages you've previously built up in a newsfile. The trick is in how you use it.

You could simulate the newsroom of a daily newspaper, but there's far more it can do. For instance, you can create a newsfile based on the invasion in 1066, with reports flooding in from the battlefield in real time. Sherston gives a demo of this technique used on the Fire of London.

Alternatively you might like to apply it to English, building up details of a story, its characters and incidents, message by message. Sherston uses Macbeth as an example, claiming that in today's three minute culture rendering the play into just a potted plot gives children a basis from which they can approach the real work.

Another use might be a recreation of a day in a police incident room, with several crimes on the go at once. The uses of Teletype resolve into two overall types: Involvement, where the children act on what's appearing as in the newsroom and Spectatorism where they are just told what is happening and nothing else. As you've no doubt gathered, there's plenty of scope for your own creativity to come into play. Teletype's a nice example of context-free software if ever there was one



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Teletype Newswire

Receiving messages on Teletype

Using the program is fairly straightforward providing you can put up with the rather tedious menu system. You can have up to five newsfiles on the go at once, each of which can contain multiple messages.

A message is the screenful of up to 26 lines of text, with exceptions. Each message can appear with a standard footer and header and the current time. It can also be echoed to the printer – you can customise the software to yours.

The essence of the simulation lies in the timing of messages. A master clock, displayed over the teletype, shows the current time. After each message there's a variable delay in minutes before the next appears – you have to wait until the clock ticks through the delay in real time.

In addition, each message can reset this time to whatever it wishes, allowing you to skip through a lengthy period. You can also display two extra clocks showing the time in different zones. Unfortunately the clocks are only 12 hour and don't show am or pm, so it can be difficult for students to tell whether, say, the US is ahead or behind us.

Still, the teletype simulation with its stream of messages flowing in all the time – particularly with multiple stories – is very effective. And the animation of the teletype head is lovely. Its noise is also realistic – and very irritating. Fortunately you can turn

➤

➤

it off. As you process the messages you can choose to Pause, Restart, Jump through to the next message with the clock automatically updating, and Stop – where the progam will save your position for a restart if you want.

Although you can mix several stories in one newsfile, it's probably better for your sanity if you keep to one per newsfile. As the program can handle up to five newsfiles at once you can still combine stories – the newsfile being used is chosen at random, though weighted towards the one with most messages left.

You can create newsfiles via a simple text editor. Although fairly rudimentary it's effective. As well as entering text here, you can also specify the delay required before the next message, whether the clock is reset and so on.

There's also an option to import Ascii files from a word processor, though on my pre-production copy it wasn't implemented.

Before running a simulation you have to set up the newsfiles required. It's at this stage that you decide the initial time on the clock, how many clocks are shown, whether you want hardcopy and so on. You do this each time you run or save it all in a start-up file.

The DFS isn't too clever and can cause havoc with disc-based programs. Fortunately Teletype has a Disc Utilities option which can help get you out of some of the *Can't extend* types of problem. The best solution, however, is simply to keep a disc free for newsfiles, which you've created one at a time. And having two drives can avert a lot of tedious disc swapping.

Throughout, Teletype tries to be as idiot proof as possible. Unfortunately at times this is taken to extremes. Having told the program that my data disc was in drive one I still kept getting prompts to put my data disc into drive one.

Unfortunately there were other examples of this worthy but irritating trait, such as being warned that I hadn't saved a file when I'd made no changes to it.

Perhaps the worst thing about the program, is the menu design. In a package with many features it is vital to get the flow of logic through menus correct, otherwise using the program degenerates into a frustrating game of hunt the option. I found the menus cumbersome, inconsistent, confusing and irritating.

For instance you've got a Main Disc menu and two other Main Menus further down. The option number for each varies, so you can never count on, say, two taking you to back up. Escape sometimes gets you up the menu tree but not always.

And some of the program design could have been better. There's no standalone or turn-key version of Teletype, so that you can boot up a disc and get straight into a simulation, although this would be perfectly feasible. The start-up file goes some way towards it but to run a simulation you have to:

- ● Enter drive for data (if not drive 0).
- ● Choose Load Teletype option.
- ● Specify start-up file.
- ● Select Begin messages.

And Start-up files don't allow you to specify sound on/off or the drive for data – yet it could do so easily and make life a lot simpler. Still, once you've mastered the menus, Teletype functions well. My pre-production version had only one or two minor niggles which were on their way to being sorted out.

And the idea is both original and capable of wide application in the curriculum. Whatever your subject, you're bound to find an application for Teletype. I strongly recommend you to take a look and see.

Summing up

Teletype is an excellent program concept with lots of useful features but it is let down in the creation process by poor menu design and lack of standalone operation.

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After his little April joke the Mad Hatter comes clean and continues his exploration of Viking lands

Confession time

TO forstall furious fans – that is if I am fortunate enough have any left after last month's look at *Erik the Viking* – let me put you right regarding the Enchanter's Maze.

It was, after all, only a *little* leg-pull: I reversed the proper directions you needed to solve the maze. So, if you hadn't worked that out, here is the correct sequence: Ahead, right, left, left, ahead, left, open door. Actually the maze wasn't all that difficult anyway, since Red usually denotes politics of the Left and Blue those of the Right – in this country, anyway. As he used Yellow to mean Ahead, perhaps Pete is Liberally inclined.

We start this month's exploration at the Stone Quay, with the Golden Road to the north and the Spell Hound around. Four moves north will take you to the Throne Room and you'll get some threatening words from Al Kwasarmi. Ignore these and open the oak chest anyway – to reveal the jar, flask and spittoon.

Now Al Kwasarmi starts to bargain: He'll help you if you bring him six objects – if you can call *the sound of a cat moving, a woman's beard, the breath of a fish, some bird's spittle, the roots of a mountain* **and** *the sinews of a bear* all objects. Don't forget to investigate the throne – one move north – before returning to the Golden Dragon.

It's time to sail to the gravel beach, so move E, N, N, N, N, N, E, E, E and E. Take the spittoon and the boiled mutton and climb up and up to the cliff edge and then up again to the ledge with the untidy, smelly nest on it. You will be able to take the polished bent stick and the bracelet once the eagle has used the spittoon and you have given it the boiled mutton.

Kings Quest IV

Back you go to the ship once more, and this time your destination is the Loch. Travelling S, W, S, S, E and S will get you there: Arm yourself with the jar or flask and the bent stick and go south and east to the grassy bank.

The bent stick turns out to be a boomerang – so throw it – and blow me down if you don't collect the amulet. Now fill your jar or flask at the pool: Examination will show that it is now full of mineral water.

It's time to move NE into the tower and then continue up until you reach the tower room in which is the gold ring. Take the ring – though Tony Marter says it is of no use in the game – and return once more to the Golden Dragon.

Your next destination is the sandy shore. So go N, W, W, N, N, W, W, N and W. Essential equipment this time consists of the spade and the jar or flask containing the mineral water. North of the sandy shore is a fertile valley and a stone tree. Shake the tree so that a stone fruit drops from it. Now take the fruit, plant it and water it with the mineral water. Then stand back amazed as the fruit grows into the mountain roots that you need as part of Al Kwasarmi's bribe. After that, you should return to the ship and await further orders.

(To be continued next month)

Problem Corner

Todd Newman is going crazy with frustration in **Lord of the Rings** part 2a. Why do all the hobbits' swords vanish when this part is loaded? Beats me. Does anyone have an answer – apart from it being another bug? If it isn't, what is the swordless way of tackling the tentacles?

Another reader, S. Deas, needs help in **Kings Quest IV**. The only way of getting this running is on the Archimedes PC Emulator: How does he help the baby ghost in the old house? Can anyone supply the answer please.

Hatter's Helpline

A sprightly Norfolk dumpling, who wishes to be known as Foztek, points out something of interest in the parser of Bored of the Rings. Try entering IAN, WILL, FERG, HCW, MSX and REM for a bit of fun.

In my solution to Lords of Time I made two omissions in Level Six: One was deliberate and the other accidental.

The path through the Hedge Maze should include going north just before the final move SE.

The deliberate omission concerned the jester's cap and, since a number of you have been unable to work out what to do, here is the correct procedure: Go to the south end of the long room where the cards and bell are. Shuffle the cards to produce the joker and discard the rest.

Ring the bell to summon the jester, give him the joker card and he will give you the cap. Look out for a serialised treatment of Dodgy Geezers which will start next month, thanks to Barbara Gibb.

Stephen Burge has written asking where he can get disc versions of a whole pile of adventures.

If they aren't on current release, the best advice I can give anyone is to put a *Wanted* advertisement in the back of this magazine – insist on originals – and to keep an eye open for games on offer there, too.

Elite Antics

Jonathan Stanton finds Galactic Hyperspace a problem because you always land up in an Anarchy system. As a cure, he exploits a rather obsure bug in his disc version but I couldn't find it on either of my two discs, so let's look at a simpler answer if you aren't anarchically inclined.

Just activate your short-range chart and choose another system the moment you emerge. However, that won't help you in Mission One, as there is an exception to the rule here: You aren't actually targeted on an Anarchy system when, in pursuit of the stolen Constrictor, you emerge from the depths of Galactic Hyperspace.

But you *must* visit the Anarchy system shown by your short-range chart once you emerge in Galaxy Two if you are to get the next message giving the ship's whereabouts.

Ian Duffy is another reader who has encountered our mystery ship – which I think should be christened the Cloak and Dagger ship.

He has made some observations which include the point that the ship has extendable wings, giving enhanced manoevrability. Ian encountered it in Galaxy One while on an extended bounty hunting spree.

Dennis Hartley has several comments on the Tube version of Elite and of particular interest may be the fact that you can save a screen to disc when the game is paused by pressing Control+D.

A moan is the slowness of the docking computer: My own tactic here is to get as close to the space station as possible, line up and only then engage the docking computer so that all it has to do is match the space station's rotation.

Charles McEvoy passes on a tip for anyone interested in having combat experience against Thargoids: It is possible to enter witch space deliberately on most attempts if you carry out the following instructions.

Launch as normal – as though you were going to hyperspace to a target system – and then pause the game. Now if you press Control+X you should hear a beep. Restart the game, press H as usual, and then press Control+X again, keeping them pressed until you enter hyperspace.

You should get the double screen effect that indicates you are entering witch space, and then there are lots of lovely hostile Thargoids waiting to donate plenty of Alien Items.

This worked most times for me with the normal 32k version and the Tube one as well, and since Charles has a Master 128, everyone should be able to go Thargoid bashing at will.

Incidentally, Charles has done something that I never even thought of attempting – flown out of witch space without hyperspacing. Mind you, it took him over three hours at full speed – that's dedicated research for you.

Paul Downes offers some advanced tips on anti-Thargoid tactics for those who want to go bounty hunting for Thargon drone ships. Incidentally, Paul says that there *is* a maximum to the number that can be harvested at one go – 200 is the bag limit, irrespective of the amount of cargo you are carrying in the hold.

Anyway, Paul believes in putting your naval energy unit and military lasers to fullest use and he writes:

‘When entering Witch Space, accelerate to maximum speed and take on the mother ship at 2 o'clock high. Accurate fire should destroy it quickly. Let the shields absorb incoming fire more than one would normally allow. The naval energy unit really performs better than one would expect.’

He recommends using the same evasive tactic as the Thargoids themselves – a sustained climb while weaving from side to side coupled with rapid speed changes are very effective. As a finale, Paul suggests that once the mother ships have been destroyed readers activate their docking computer and see what happens.

Alexander Hayward, a child of tender years, seems to spend most of his spare time tempting Vipers to their doom by first blasting the space station he has just quitted and then zapping the police.

When he's had enough he uses his escape capsule to wipe his record clean. I always thought it was the old who led the young into bad habits. Seems I was wrong.

While dealing with juvenile delinquents, readers might be interested in the experience of Jonathan Sutherland, who lives in Shetland.

This canny lad blasted away at the space station at Lave, and then proceded to wipe out the vengeful Vipers. As the last one was destroyed, Jonathan reports that lines appeared over the screen as if the screen was breaking.

This effect vanished along with the Viper and he hyperspaced to Zaonce – to find he was Cr. 3603.1 better off. Jonathan has the second tape version that was released.

J. Langford offers an Elite speed-up tip: Provided there are no ships on the scanner – he doesn't mention the Cloak and Dagger – try pressing f6 – the Data on System report – and the game should double its speed.

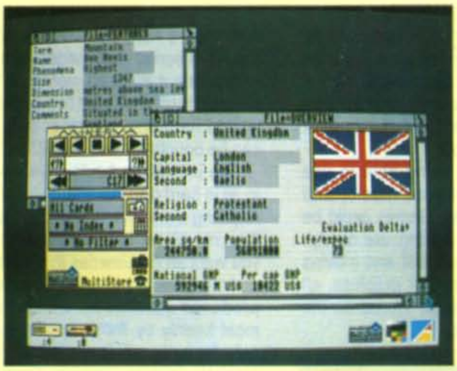
Mike Jordan has seen the C and D ship on his Tube version three times – so there's hope for poor old me yet. Mike also suggests the following tactic for rock hermits. The asteroid looks like a normal one, but it doesn't blow up at the first hit – a ship is launched instead. Take the ship out, blow up the asteroid and then pick up all the goodies floating around. Don't forget that rock hermits are only found on the Master 128 and Tube versions of Elite to the best of my knowledge.

Matthew Aldridge dealt with the C and D ship by using a missile at very close range to foil its ECM system – he only had pulse lasers at the time. One reader says that this ship is energy bomb proof – does anyone care to dispute this?

John Horseman refers to an Elite cheat in a letter but gives no details. Can anyone enlighten me or (better still) send a copy of the program so that I can work out exactly what he is referring to?

Paul Weatherall has had small brother problems. In Galaxy Two he docked at Reveve to find the message initiating Mission One awaiting him – and small brother cleared the screen before he'd finished finding out where he should go to.

I'm guessing at the destination – Cearso – but can advise Paul that he should equip himself with a military laser in order to penetrate the Constrictor's armour. If any reader has started Mission One from Galaxy Two and has a different starting point, I'd be glad to hear about it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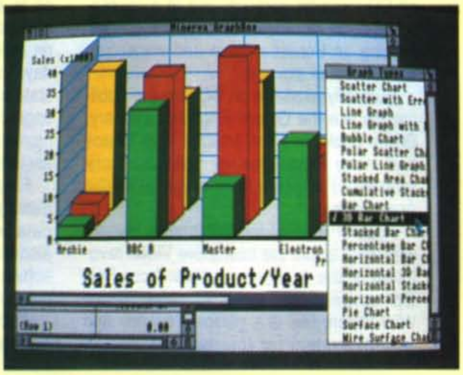
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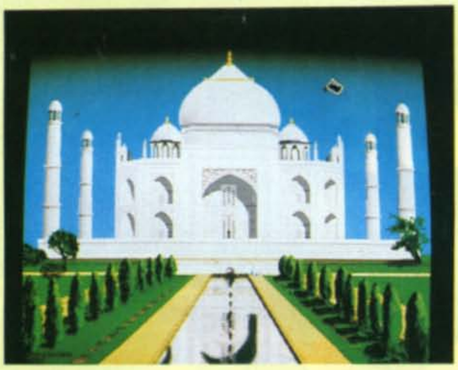

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At the speed of light

Ray McCullough peers into the future of data storage

THERE can be no doubt that CD roms are the storage medium of the future. Super speed and vast storage capacities are now becoming available for the Archimedes range. Once you've tried one you'll wonder how you ever managed without it.

The latest to be released, the 550Mb Acorn unit was Developed jointly with NeXt Technology Corporation of Cambridge. The drive will play standard audio CDs, conforms to the industry standard High Sierra specification and costs around £600 for the player itself.

But you'll also need a Small Computer Systems Interface – SCSI (pronounced *scuzzy*) – costing £150.

NeXt Technology offers to produce one off CD-roms for personal use at a reasonable price – an ideal resource for schools running an Econet system and wanting to economise on storage.

Currently available on CD-rom are publications like the Oxford English Dictionary, British books in Print, Images from Space and many more. Several publishers are interested in producing material in the Acorn format.

Another product for Archimedes owners who want to join the Interactive Video revolution is the Archilock system from Soft Option. Developed jointly with Newcastle's Wild Vision, this is a genlock, overlay and control system for Interactive Video. It allows Archimedes text and graphics to be mixed with external video pictures from video tape, videodisc or camera. With it video and graphics can be faded and colours made transparent, giving very flexible control over the output.

Imagine, however, being able to use your micro to control your music, and eventually video as well. Games could be marketed on CD-rom, making use of high quality sound and music, still and moving video frames and computer graphics, all controlled by the software stored on the same, incorruptible disc.

History

When the home micro was first launched on to an unsuspecting public the standard method of storing programs and data was on ordinary cassette tape. In those far-off days of computing cassette tape was the state of the art. Since then most of us have upgraded to floppy disc, the advantages of increased speed and random access being essential for serious applications.

Floppies, however, are easily lost or damaged and can only hold up to 800k of data, even on an Archimedes. They can also be noticeably sluggish when used with software such as a database requiring constant disc access.

And so today many of us are probably seriously considering, or have already opted for, a hard disc. This is reflected in the A400 series Archimedes, two of which incorporate a 20 or 50 megabyte hard disc as standard. The A410/1 comes with a built-in hard disc controller and the drive can be bought for less than £500.

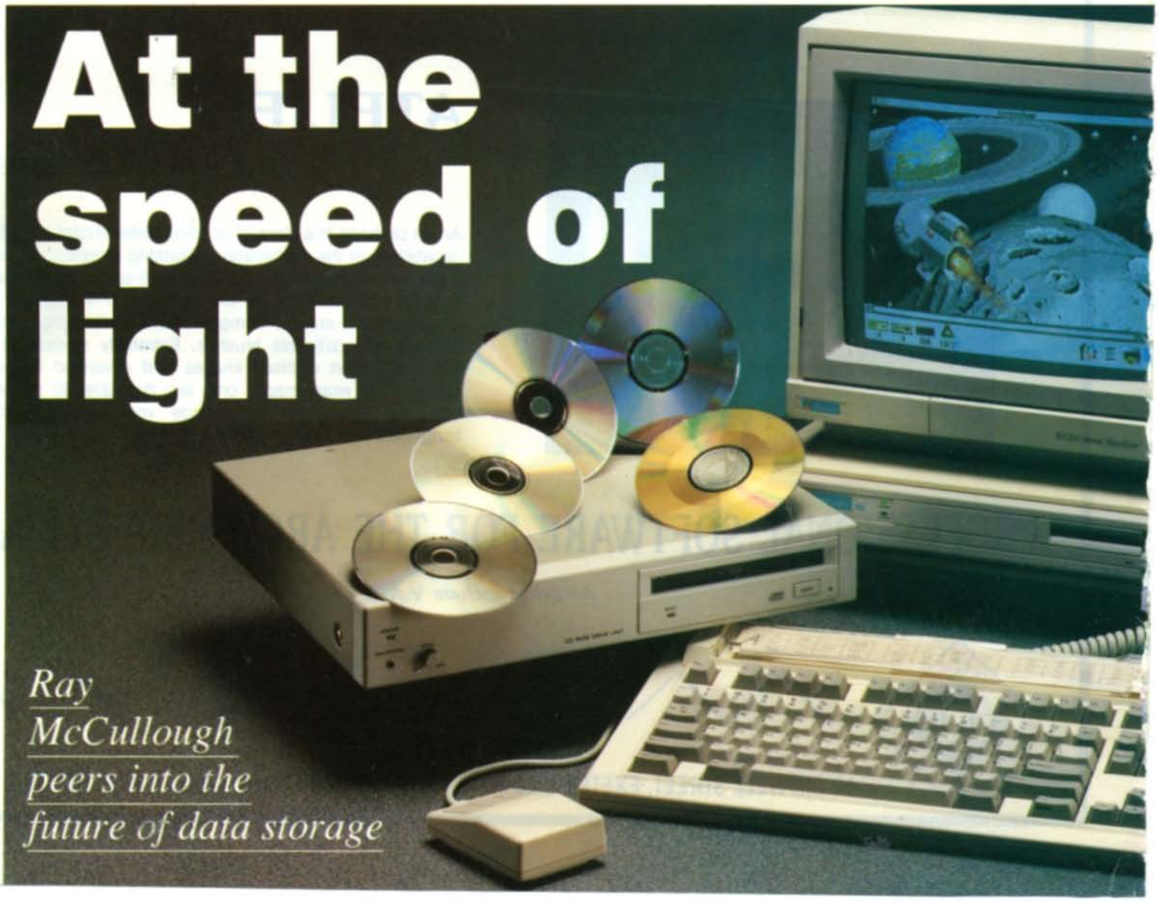
The immediate future then would seem to lie in hard disc storage, at least for those requiring more and more performance from their machines. Let's face it, isn't that why you want an Archimedes in the first place?

Advances in storage technology have produced advantages which will be felt most keenly by those applications which rely heavily on the storage of large amounts of data – mainly databases and database-related software, but including CAD and other image manipulation software which tends to be storage intensive.

However, there are still many applications requiring mass data storage which, at present, are not suitable for computerisation. Applications such as component catalogues – car parts for instance – require not only text to be stored in the database but also large amounts of diagrammatical or pictorial data.

Further examples would be medical records which may include X-rays and other applications requiring photographic detail such as lists of properties available in an estate agents, reference material on birds, animals, plants, fish and so the list goes on.

Philips, the Dutch electronics company,



has for several years been at the forefront of optical storage technology. The first result of its research was the release, with Sony, of high quality compact discs and players for audio use. Sound information is converted to digital data and stored as a series of zeros and ones on the disc surface, thus allowing exceptionally high quality reproduction of music and vocals.

In 1986 – 900 years after William the Conqueror and the Domesday book – the BBC, together with Acorn and Philips, completed a two-year project known as the Domesday system. Philips' contribution featured the LaserVision videodisc player, developed especially for the project, thus heralding the era of optical disc computer storage. The whole system is driven by a Master.

The system uses a 12in optical disc holding 300Mb of data on each side. Information includes text, the software to control the system, ordnance survey maps of the whole of the UK, more than 50,000 photographs plus sound and video sequences.

This technology is commonly referred to as CD-rom, although sometimes also known as LV-rom. The original system contained two laser discs. Since then several additional ones have been produced, including topics such as ecology – a video tour of a nature reserve – volcanoes and industrial and management training packages. These discs open up a whole new world of interactive video to users.

Recently we have seen the introduction of compact disc video, which reproduces not only high quality sound but also video output. The quality is greatly enhanced due to the fact that the data is stored digitally – still frames, for instance, are of the same standard as the moving video sequences. All this is now available for about £600.

The same type of disc is used to store data for CD-audio, CD-video and for CD-rom, although different disc sizes are employed, from 4in to 12in. The disc is manufactured of moulded polycarbonate plastic with a reflective aluminium coating on either side. Pits are created in the surface during manufacture, which cause a reflective or non-reflective spot in the aluminium layer.

Each bit of data, zero or one, is represented by one of these spots, more than five million of which can be stored on a single disc.

This data can be read by a low-power laser beam, enabling the data bits to be placed very close together – only 0.6 micrometres apart – the average integrated circuit has circuit lines more than one micrometre apart.

This makes possible a storage capacity of more than 500 megabytes per disc.

The discs cannot be written to by the user – hence the term Compact Disc Read Only Memory – and are therefore only suitable as a publishing or distribution medium.

And it is not possible to use CD-rom for your personal data storage.

But, there is still quite an advantage, as the discs themselves cost only around £5 each and can store such a large amount of information.

A typical CD-rom will store 250,000 pages of text at present – approximating 1,000 floppy discs. Future developments will increase this by four times to one million pages – enough to fill several filing cabinets.

Worm

Better still would be a system which allows data to be written to the disc, as well as retrieved. Worm discs – Write Once Read Many – can be written to only once but can be read over and over again. They behave, therefore, in a very similar way to prom devices and cannot be erased.

Here the optical drive contains two lasers. The high-power unit is used to write to previously unused areas of the disc surface. The information recorded is read using the normal low-power laser as with CD-roms.

Using Worm drives for data storage will result in many permanent copies of files – which can be an advantage in some applications. Regular backups can be made to hard disc or floppy with a final optical backup at the end of each work session.In practice, although many files are created, it will take quite a while to fill 500Mb of storage, and when the limit is reached it is simply a matter of copying the required files on to a new disc and carrying on from there. Worm drives are available at present for IBM-compatibles – Archimedes and Master 512 users take note.

Magneto/optical

There is yet another type of optical system, the magnetic/optical drive, referred to as MO. These discs behave like ordinary floppy or hard discs and can be written to over and over again. The process is very similar to an eeprom – electrically erasable, programmable read-only memory – but instead of an electrical signal a magnetic field is used to rewrite the data.

Again, separate lasers are employed. The magnetic field is switched to represent zeros and a high powered laser is used to melt a very small area of the disc surface which then aligns itself magnetically with the existing field. The molten area solidifies immediately and is permanently set to zero.

All of the required bits are set to zero and the field is then switched through 90 degrees so that the "ones" can be written in the same manner. As with previous methods, the disc is read using a low-power laser. The disc is not susceptible to magnetic fields after it has been written to and can be stored near a speaker or monitor without danger of corruption.

At present these MO drives are available only for mainframe and mini computers and are extremely expensive – £9,500 for the Infinity system from Alphatronix, running on Vax and MicroVax equipment. These drives use a 5.25in removable cartridge with 650Mb capacity.

And next...?

The future, then, would seem definitely to include optical storage and we may well be using CD-rom, Worm drives or even MO storage before very long. This will have the effect of opening up many new areas to computing.

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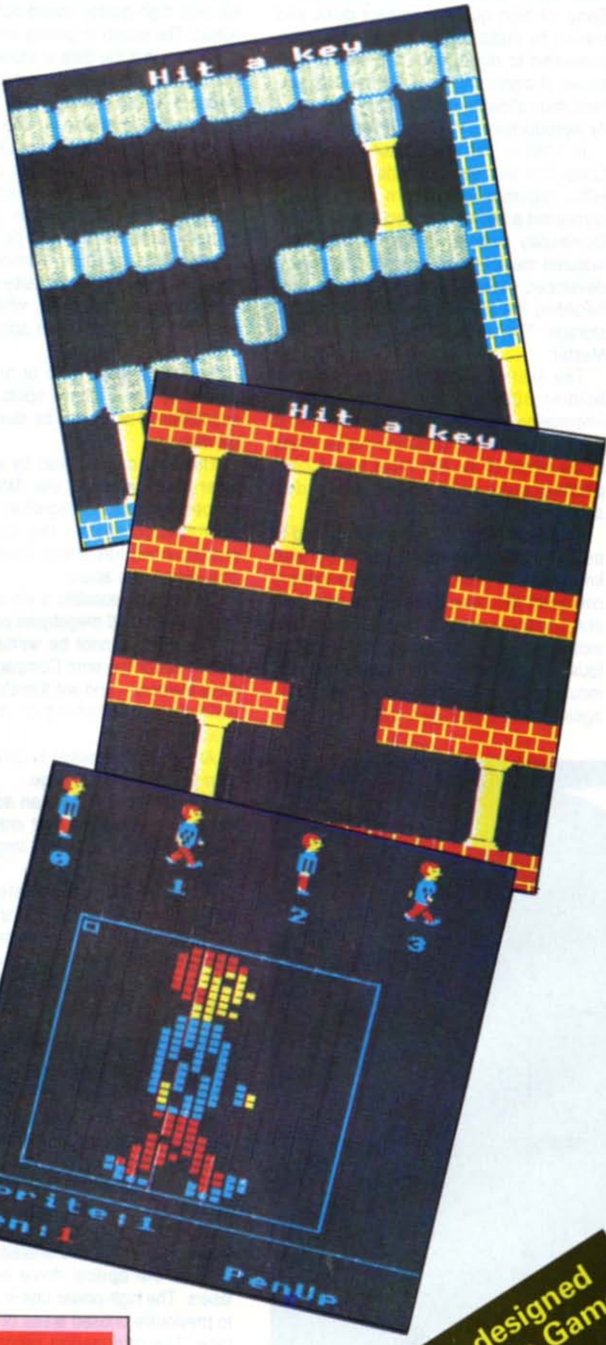

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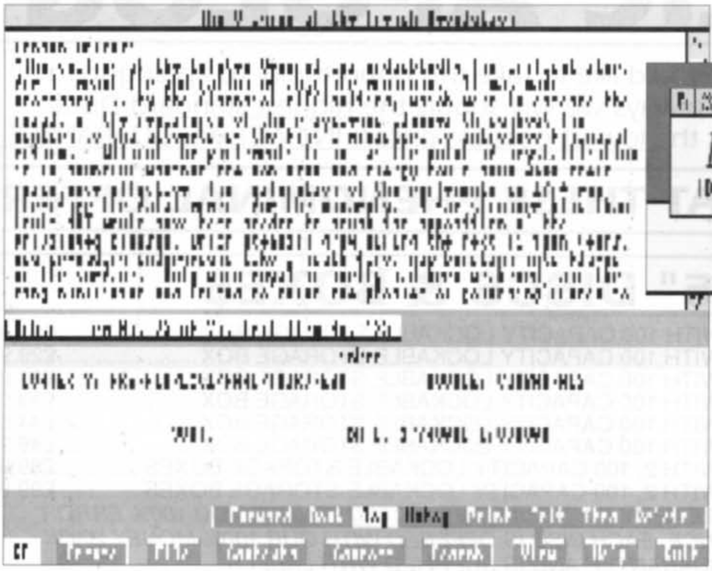
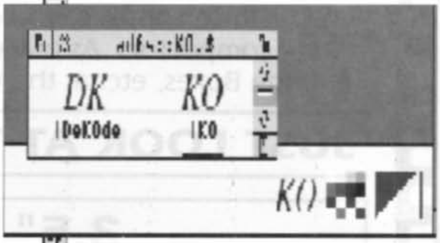


Knowledge Organiser in action

On the icon bar



Lawrence Brightman explores free text databases and sees how the only Archimedes offering compares with its MSdos counterparts

The fruit of learning

Product: Knowledge Organiser
Price: £59.99 (£40 for upgrade from Arc-TFS)
Supplier: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA.
Tel: 0606 48511

KNOWLEDGE Organiser – KO – the free text relational database recently released by Clare's Micro Supplies, is a rewrite of the original Arc-TFS by Sean O'Conhail. Although it is completely compatible with databases which were created with Arc-TFS, the upgrade has significantly increased both the utility and appearance of the original.

KO does not use the standard Risc OS user interface, but has one which is similar to Arc-TFS which was originally designed to work under Arthur.

The interface is not difficult to learn but it does mean yet another technique with which to come to grips.

Clares seems to have done this with a number of its packages, and frankly it detracts from what are often excellent applications. If Risc OS is the best Wimp system in the world for micros and the easiest for programmers to work with, why not use it?

When you first load KO its icon appears on the icon bar and when this is clicked the application takes over the whole machine. As long as there is sufficient ram any applications on the icon bar will remain and be accessible when you exit KO.

The size of database it can handle is limited only by the disc space available. The creation procedure for each new database requires you to specify the expected size and value of a number of parameters adjusted by use of the mouse. It would have been more convenient to allow direct entry via the keyboard as well.

Six parameters can be changed, all affecting the amount of space required for each database:

- The maximum length allowed for Context code explainers. As each code is created, an explanation field is linked to it.
- Number of context codes to be used.
- Maximum permissible length of the source code descriptions.
- Number of sources to be filed.
- Average length of each of the text items.
- Number of text items.

Source codes can be up to 10 characters long, while context codes can be up to six. Further user-defined search/data – linker – fields can be specified and you can specify the length and placement of their windows using the mouse.

Although no limit is given for the number of these additional fields, it should be remembered that they will take up disc space, as each field is given space for each entry so this will be a factor in their number, especially if disc space is limited.

Although the average length and number of text fields is specified during the installation process, KO is quite flexible, allowing either longer or shorter entries up to a maximum of 200 lines.

It can search files created using Clare's Graphic Writer, Acorn's First Word Plus or Colton's Pipedream, or any Ascii files, although it will only display the first 200 lines.

A very sophisticated text referencing system could be established using KO in connection with any of the above word processors or Ascii files, with Risc OS allowing easy access both ways between KO and the word processor.

Although KO allows editing of Ascii text fields as you view them, the text files from these word processors cannot be edited within KO but only viewed or their text printed for the first 200 lines.

In the other direction there is full capability to export any Ascii files created or edited using KO's editor into the different formats of the above word processors.

Facilities are similar to those in Arc-TFS, so a previous user of the latter can be up and running with KO in short order. No programming is involved – in fact, the structure and use of the database is one of the easiest I have seen.

Searches can be conducted using any fields defined for that database. One field is specified at a time, but additional searches can be done on each subset, thereby allowing AND/OR searching within, and in addition to, the subset which was obtained on previous searches. The results of searches can be individually tagged to make further subsets for later searching.

The contents and pointers of the context and source fields are loaded into ram when the database is called up, so searches are speedy.

Text string searches within the text field are done through disc access, which will be significantly slower, unless a fast hard disc or ram disc is used.

Once the search fields are selected and the codes or words specified for each selected field, KO goes through the entire database, counting the number of text entries located.

The search completed, each entry can be viewed, edited and printed via the View menu, moving forwards or backwards within the subset selected by the Search routine.

Unfortunately, when text is searched and found it is not highlighted, so you can only be certain it's there somewhere on the screen.

Editing is allowed while viewing, as is tagging which can produce a resident subset that can also be searched.

Printing is allowed as well at this stage, either of the Linker fields or the text field too. Text can be imported or exported using any of the word processors mentioned or Ascii files.

In addition, files can be either directly or indirectly loaded using a Z88 and a serial link.

If files are imported rather than just viewed editing is allowed, but they will be kept to a maximum of 200 lines each. If you attempt to load a file larger than this, you are warned, and if you persist, only the top 200 lines will be saved as an import.

A DeKOde utility enables use of any word processor file containing Ascii data for importation – it simply strips out any non-Ascii characters. In addition, files from three online databases, Infocheck, Neris, National Educational Resources Information Service, and Prestel, can be loaded directly into DeKOde for importation into KO.

As DeKOde has been designed to be expandable, Clare's is interested in anyone who writes a Basic routine for other semi-Ascii file types, for inclusion of their routine within DeKOde.

Facing the competition

How does OK compare with MSdos free text databases like Textmaster, Gofer, Turbosearch, Magellan, Viewlink and Zyindex?

With many of these packages, the files which constitute the database have to be indexed first, allowing faster searches than could be done using straight disc accessed string searches but subsequent additions requires re-indexing.

All read Ascii files and perhaps two or more word processor files directly, and possibly dBase databases.

Keywords are used in some, while others depend only on Boolean text searches, although, as in Gofer, these searches can contain three or four words in one search, with AND, OR, NOT and NEARBY searches possible.

Graphics can be used, to a minimal extent with Textmaster and Magellan, which can be used for other purposes than free text databases, allows the viewing of Lotus spreadsheet files.

KO's main limitation is the inability to view a file's graphics contents – although only in comparison with Textmaster – and the limiting of a search to AND/OR relationships, although it may be argued that NOT and NEARBY have limited usefulness.

On the other hand, none of the MSdos packages allowed specification of user-defined linker fields, which KO does.

KO has a form of indices in the use of these linker fields, and as they are loaded in ram, searches on them are as fast as possible.

The MSdos packages lose speed because their indices all have to be disc accessed, their antiquated limit of 640k coming into play here.

However, their indices are based on the text files rather than separate linker fields.

KO's searches of the text fields are only normal string searches, which take longer than indexed files but more are generated.

The organisation made possible by the use of user-defined linker fields in KO is superior to the organising capabilities of all the MSdos packages, which also require at least as much of a learning curve as KO for you to become accustomed to their use.

Although KO has that 200 line limitation, in relation to the limited field display on the other packages this really isn't a problem.

There is lack of highlighting of selected text search strings within KO's text field, which was present, however, in most of the MSdos packages. The ability of some to search databases is not a real factor, as KO could search other Archimedes databases as well, depending on whether or not their data was in Ascii form.

It would be useful to be able to search spreadsheets, but most of the MSdos applications could not do so either, their ability being limited to searching the spreadsheet file names or labels – Magellan was able to search entire Lotus spreadsheets Most spreadsheets can be converted to text files, so this is not a real problem anyway.

A limitation of some, but not all, of the MSdos packages lay in their unreliability regarding large numbers of files, in which either searches were not correctly carried out, or fell over with an error message.

KO does not have this limitation, at least with the number of files I searched, as long as the data was in one of the word processor or Ascii formats mentioned.

Summing up

KO is a significant improvement upon Arc-TFS and is very good value for money. It could be further improved by the use of highlighted search strings within located text fields, and perhaps by allowing viewing graphics in scanned text files. It would also be an aid to see more than 200 lines within a text file.

But these are not vital, and KO provides well for most eventualities and requirements of a free text database.

It also compares well with MSdos free text packages, either being as good as or better than them in most applications. This is despite the fact that they are in most cases much more expensive.

KO can be used by anyone requiring to store lots of text items, the organisation of which has gone beyond simply using directories and searches using word processors or outliners. It would be an aid for any researcher or student.

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Cheap hard discs?

I OWN a Master 512 with dual drives and printer and I have been looking into the idea of adding a hard disc to my system. When I looked at the drives for a BBC Micro I found the price starts at around £350, which I consider as being over the top.

I have started to wonder if I could fit a standard PC hard disc: After looking around I find these can be bought for about £150 and this I consider a more reasonable price. But how can it be fitted? – **C.R. Maughan, Ketley, Telford, Shropshire.**

● *It does sound like a marvellous idea to use a low cost hard disc from another machine, but there are two problems.*

The first is that they are not physically compatible so some form of interface adaptor will have to be made.

This is not so much of a problem, however once you have connected them together you need to write a filing system to make them talk to each other.

You can't use an existing BBC Micro hard disc filing system because it will be expecting to talk to different hardware and also you would be in breach of copyright.

The fact is that writing one is a much more daunting task than designing the hardware, and as far as I know has not been tackled.

Topics on the agenda...

- ***Swapping drive identities***
- ***65Host printer problems***
- ***Rom replacement troubles***
- ***Missing cursor and colour changes***
- ***Monitor to Chameleon compatability***
- ***Crashing with Quest Paint***
- ***Hard discs on the cheap***
- ***Reducing a noisy speaker***
- ***Limited colour for Archie***

Swapping drives

I HAVE a Master Compact with an extra 5.25in drive, DFS and ADFS and would like to know if it is possible to swap the drive numbers to make the 5.25in drive numbers 0 and 2 and the 3.5in drive numbers 1 and 3.

I would like to do this because a lot of software not available on Compact format is there for the BBC Master on 5.25in in DFS.

However, when I try running the programs on the 5.25in drive I invariably find that at some point the program tries accessing drive 0 and the whole thing comes to a halt.

Also as most of the software is protected I cannot transfer them from DFS to ADFS or 5.25in to 3.5in, which leaves me with only a small selection of software to choose from. – **Peter Clinch, West Berlin.**

● *It is quite simple to swap over the drive identities. There is a row of links on each drive close to the cable connector which can decide the drive number of a device, so changing them will change the drive.*

For something a little more convenient you could break into the disc cable and insert a double pole changeover switch .

Improved emulation

I HAVE recently bought an Acorn A3000 after many years of using a BBC B. Naturally I was looking forward to using some of my rom images on it until finances permitted me to buy appropriate native software.

After several frustrating hours attempting to get my document printed from Slogger's Starword, I eventually realised that the 6502Host emulator does not have access to the A3000 printer port. Is it possible to get 6502Host to access the printer port as I find it hard to imagine what use this emulator is if you cannot print anything from it? – **R. Hewett, Swanley, Kent.**

● *Good news: On the RISC OS 2.0 Extras disc there is a new version of 6502Host that will access the printer port. This disc is available from dealers.*

Worn-out connector

ABOUT a month ago I found that my BBC B would crash for no reason – usually with a listing in – then on power-up the screen would be blank.

A friend said it could be the ULA, so I ordered one. In the meantime I started a check on the pin-out from the keyboard and found a couple of dry joints. A quick run over with the iron and I was back in business.

I've had no further trouble but tend to keep the top off, as the micro gets a little hot. And I've now got a spare ULA.

From reading your Problem Solved I've noticed that this is a fairly common fault. Perhaps your readers could try the suggested cure themselves or get someone with a test meter to do it for them.

It seems that the problem is caused initially if you don't have a rom board and keep changing the roms. Disconnecting and connecting the ribbon cable tends to loosen the soldered joints. – **R. Harvey, Weston-Super-Mare, Avon.**

● *Thanks. Another cause of the problem can be the ribbon cable connectors themselves. These are the insulation displacement type and are subject to intermittent connections when they get old.*

Flashing dots

I OWN an Issue 4 BBC B containing DFS, AMX Superart and Wordwise Plus roms and don't know much about the internal workings of my micro. It has recently developed a problem which I will attempt to

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describe to you. Firstly, there is no cursor when in Mode 7 or Wordwise, yet it still appears in the other six modes. The second part of the problem is with the colours and graphics. When I change the screen to Modes 0 or 3 it becomes randomly covered in dots which flash from blue to yellow.

In Modes 1 and 5 any character typed in flashes blue, yellow and red and in Modes 4 and 6 the screen is randomly covered in red dots and alternately flashing yellow and blue dots. Obviously this affects any software involving graphics.

Please could you tell me what I should do to correct the problem, I would be extremely grateful for any advice. – **Richard Bromley, Warrington, Cheshire.**

● *The two problems might be related. I am assuming you are changing mode using MODE and not a VDU 22 command, as the latter does not reset the value in HIMEM.*

I am also assuming that any attempt to change the graphics colours has no effect. If that is the case it all points to the IC6, the video ULA. You could test this by checking that the signal on pin 25 is going up and down – this is what controls the cursor flashing rate.

If this is not working you can try replacing the 6845 video controller chip.

Incidentally, did you know that you can replace the teletext chip with a SAA5056 to get Hebrew characters in Mode 7 or an SAA5057 for a Cyrilic alphabet?

Chameleon monitor

I WAS very interested in your January Body Building feature. I want to use the Chameleon circuit and would just like to check that my present monitor, a Microvitec Cub number 1431 MZ, will be suitable before I buy the kit.

On opening the back it seems to have the links mentioned in the article in the positions appropriate to Digital RGB. Will it be safe for me to proceed? – **F. Bridges, Kingswinford, West Midlands.**

● *From what you tell me, your monitor should be suitable for use with the Chameleon. However, I omitted to mention in my article that when you change over the links the brightness control no longer works.*

If this results in the screen being too bright or dark you can adjust the output of the Chameleon by altering the 220Ω resistor which is in series with the output.

While we are on the subject of the Chameleon, I am afraid a small error crept into the circuit diagram. The resistors marked 5K6 should be 6K8. This will make the smallest brightness step exactly equal. Also note that the resistors connected to the 74LS189 should be of 1 per cent tolerance.

Random crashes

MY issue 7 BBC Micro has lived a happy life until recently when it started to crash occasionally. The fault was diagnosed by Watford Electronics as being hot ram chips, which were eventually replaced. The problem recurred at first but was corrected.

Recently I upgraded to a sideways rom board, also from Watford, to accommodate their MkII 1.54T DDFS rom, Basic, Disc Doctor, Edword, Dumpout 3 and Replay roms. I bought their Quest Paint software and the problem surfaced again.

I'd switch on the micro and load the software. It would either crash after 15 to 30 minutes or hang up when I tried to enter the I/O menu, causing the art drawn to be corrupted. During Basic programming, while not using Quest Paint, the micro would again hang up, and, for instance, the I/O menu would appear corrupted when a program was listed.

The micro was again sent to Watford Electronics for repair, and at first the staff couldn't find anything wrong. Showing them Quest Paint being used until it crashed changed their minds and the micro was returned, again apparently fixed, with a brand new motherboard.

The problem had, it seemed, been cured. However, a few weeks later it returned and I've resorted to using the micro without Quest Paint plugged in and haven't had any problems.

I would like to know whether my micro has seen the last of its days or whether the Quest Paint chip is faulty, considering the fact that it also crashed on a second BBC issue 7.

Although this is rather a long-winded problem I'm desperate for an answer as I am considering buying Watford's Wapping Editor package and want to know the chances of this crashing on me. – **Roderick Forsythe, Brentwood, Essex.**

● *The problem with many descriptions of faults like yours is that they lack any technical information. I 3am not sure what I can do by letter that Watford Electronics has not been able to do with extensive hands-on experience.*

It is notoriously difficult to track down an intermittent fault and it is doubtful whether removing your Quest Paint chip has really performed a cure. Replacing the motherboard does not leave many things that could still be wrong with your machine.

It is very remotely possible that there is an intermittent fault on the rom itself causing it to stop working, in which case a replacement might be a cure.

If your micro continues to work correctly without this rom then it is worth a try. I am afraid there is no way of predicting whether you will get trouble with any other package.

Monitor match

I HAVE an Amstrad CTM640 colour monitor which has a 6 pin DIN plug and I would like to know if it could be connected to an Archimedes. The pins are as follows:

Pin 1 – Red
Pin 2 – Green
Pin 3 – Blue
Pin 4 – Sync
Pin 5 – GND
Pin 6 – LVM

I hope you can help. – **D. Richardson, Wednesbury, West Midlands.**

●*It looks as though yours is a TTL RGBI monitor. This means that each gun can be off, half on or full on. As such it can only display a limited range of colours – 16 in all – but as the Archimedes does not supply a luminance signal it would only show eight.*

Given the quality of this type of monitor I would be very reluctant to connect one to my Archimedes even if it did work.

Curing a rasping speaker

RANDOM rasping noises keep being emitted from my BBC Master 512's loudspeaker. This does not affect the micro's performance, but I'm worried that something is wrong.

Occasionally on startup the machine produces strange patterns on screen and hangs up. It has no extra roms fitted, as I mainly use rom images.

Also could you please tell me if there is any way to utilise the 512k of extra memory in normal BBC mode? – **R. Burgess, Battersea, London.**

● *Such a sound is normally a sign of a loose connection in the audio circuitry, typically in the speaker lead itself. To track it down you need to remove the lid and try to generate it yourself by waggling leads and gently pushing areas of the circuit board.*

Once when someone saw me doing this to a micro I was accused of trying to fault find by faith healing and the "laying on of hands".

If the machine hangs up on power up probably the reset circuitry is wrong. Is this condition is cured by pressing the Break key? If so it is likely to be the timing capacitor C21 – it might have been fitted the wrong way round, or needs replacing.

The 512k of memory is only available to the second processor, and so can't be used by the processor in the normal BBC mode.

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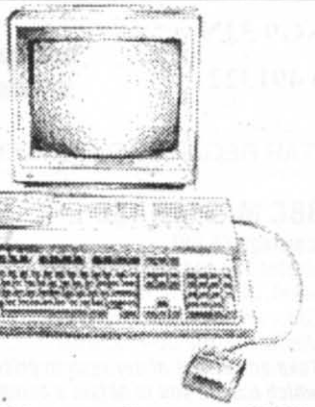

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...break out again

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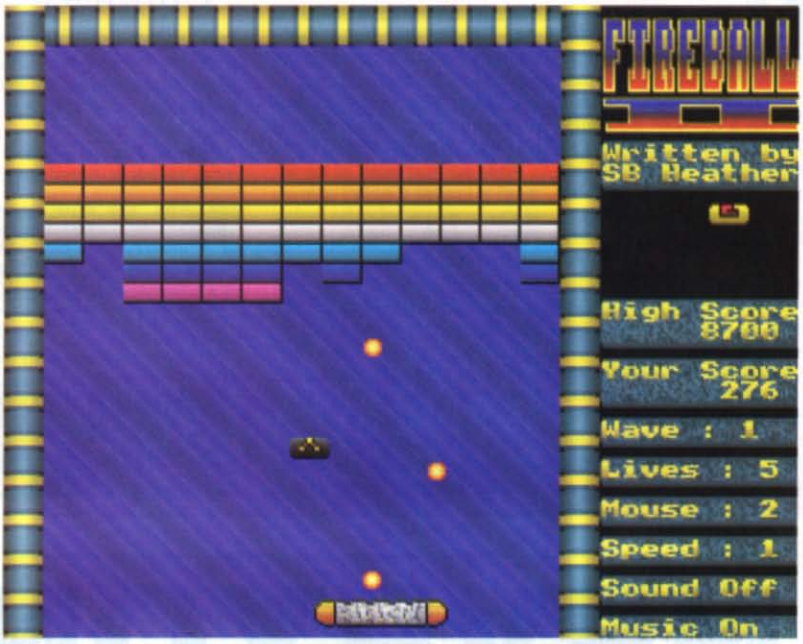


```
FIREBALL II
Written by
SB Heather
High Score
      8700
Your Score
       276
Wave : 1
Lives : 5
Mouse : 2
Speed : 1
Sound Off
Music On
```

THE 8 bit BBC Micro – along with the majority of other types of machine – have versions of Breakout, usually upgraded to include lots of extra features apart from just knocking bricks out of walls.

An early version appeared for the Archimedes many moons ago called Fireball and now we have the sequel, Fireball II.

Loading up the software reveals that not only do you get Fireball II on the disc – complete with pretty icon – but also the original which, while similar in many ways to its successor, is still worth playing.

Double-clicking the Fireball II icon loads an extremely simple but effective title screen which gives way to a colourful menu. On the right are the scores and statistics and in the middle are the various control keys.

Apart from the standard pause and sound controls, there's also music on, suicide, mouse sensitivity, quit and screen editor. Pressing the spacebar takes you into the the first screen which is a simple set of blocks to be knocked out.

However, as with all games of this type, things aren't that simple. You click the left-hand mouse button and the ball shoots upwards, bounces off a brick and about one in ten times a capsule will begin to float down – or rather head downwards, bouncing left and right making it that much harder to collect. The options are quite extensive and appear to come in three basic varieties – the currently active ones appear in a box in the top left of the screen. Some types can be combined, while others cancel previous effects.

Bat effects include reverse controls, sticky bat, laser, double, extended, shadow bats, protected and normal. Ball modifications can double the number of balls – cumulative up to 10 – add up to 10 balls, drill through one-hit bricks. There's also a jump to next level.

There are 14 types of bricks. The first eight just score points and have one hit, but the others can take more damage before disappearing. There's also an invisible brick that's invincible.

Two types drop bombs – which can be deflected if you have protection, and one type has two hits but re-appears after a short time.

The combination of all these options means that you get a set of complicated screens that will at first drive you mad trying to knock them out. However the game as a whole is not too difficult to get into and you'll soon work out what to avoid and what to go for.

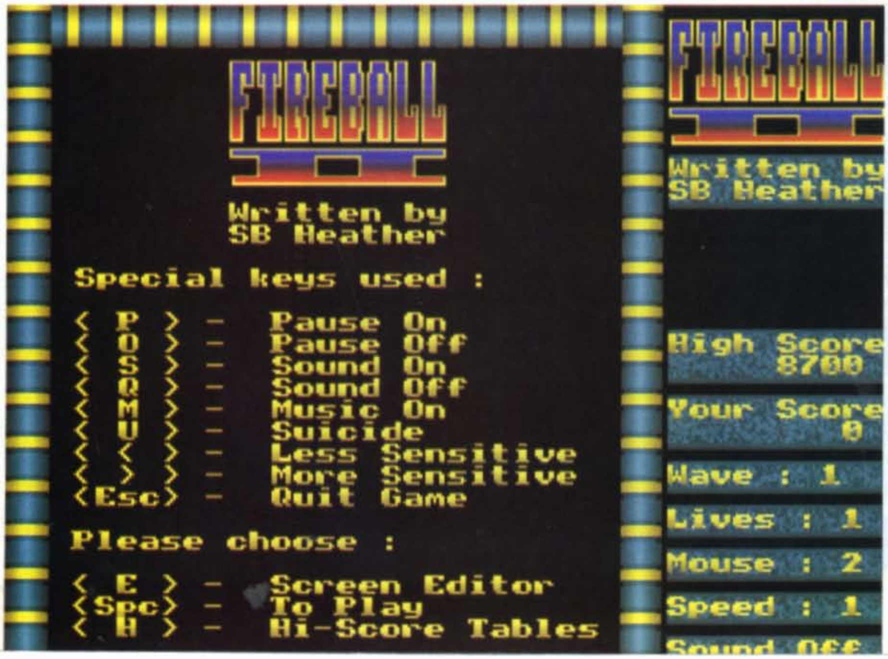
The screen editor is extremely easy to use, affording you all the facilities to load and save the entire set of 60 screens.

It also means that you can play the ones provided in a sort of cheat mode because you get infinite lives from the editor.

I found Fireball II good fun and the music is very catchy.

Lazarus

Sound	*7*
Graphics	*8*
Playability	*9*
Value for money	*6*
Overall	*7*



```
FIREBALL II
Written by
SB Heather
Special keys used :
< P >   -  Pause On
< O >   -  Pause Off
< S >   -  Sound On
< Q >   -  Sound Off
< M >   -  Music On
< U >   -  Suicide
< < >   -  Less Sensitive
< > >   -  More Sensitive
<Esc>   -  Quit Game
Please choose :
< E >   -  Screen Editor
<Spc>   -  To Play
< H >   -  Hi-Score Tables
```

```
FIREBALL II
Written by
SB Heather
High Score
      8700
Your Score
         0
Wave : 1
Lives : 1
Mouse : 2
Speed : 1
Sound Off
```

Price: £9.95
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Tel: 0652 58585

PERPLEXITY

Confused? You will be...

NOW could the ever-popular Repton, with its combined puzzle and arcade action elements, be improved? The answer lies in Perplexity, which could be described as a 3D version of Repton.

The inlay is reminiscent of Pacmania on the Archimedes – and that's just a 3D version of Snapper. While that's fast and colourful, Perplexity shows that the 32 bits are only an advantage, not a necessity.

You wander around 16 screens collecting diamonds, some of which are visible while others are formed by pushing two green boulders together. Each time you collect all the jewels on one screen you move on to the next.

It sounds easy, but accidentally push one rock against a wall and it could mean going back to the start. On several occasions I wished I'd had a pull option as well as the push one. To add to your problems, a few monsters are lurking around, so beware. Most of the boulders form diamonds when pushed against another but some – identified with a question mark – are mystery ones and form one of four other objects. They are positioned at different places in each game, so even if you know a particular screen well, you could still run in to trouble.

While you must collect all the diamonds to complete a level it's up to you whether or not you collect the mystery objects created. Three of the four are useful but the other should be avoided.

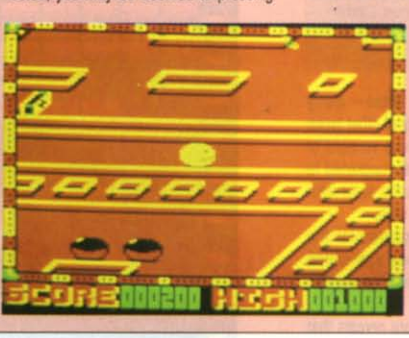
One certainly worth collecting, is an hourglass which provides extra time. With only 500 seconds to complete each screen this is a welcome bonus. Extra lives can be obtained by collecting four bottles of the magic potion sometimes formed when the mystery boulders touch.

Don't collect the control key swap object unless it's blocking your way and you have no option. Sometimes they swap the actions of all four keys; at other times they only swap two. If you are forced to collect one you can look for another and, if you're lucky, it may reverse the original swap.

However, once one of these is collected, you may be doomed to pressing the right key for left and the left key for right. In this situation it's very easy to accidentally push a key against a wall.

The final mystery object is a 500 point bonus. As well as the boulders, mystery boulders and monsters you'll find a few other items. Some of the pasages are locked and you'll find keys scattered in the maze. Only ones facing the correct way will open a lock, so find it and push it round.

Once it touches the lock the way will be cleared and you can proceed. There are only enough keys for the number of locks, so careful thinking about how to get the locks to



NEVRYON

...a sideways blast

Price: £14.95 (5.25in disc), £15.95 (3.5in disc)
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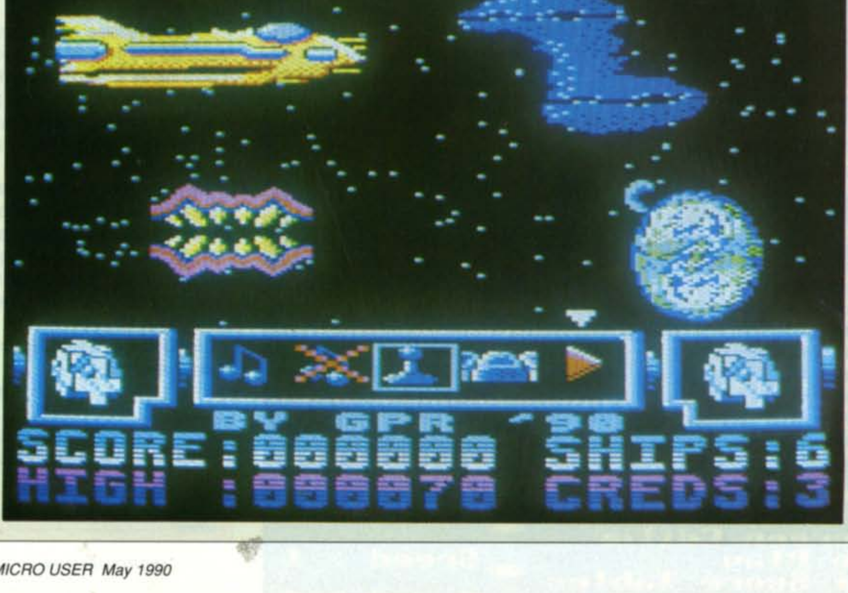
IT'S time to save the universe again. On this occasion your planet, Nevryon, is being attacked by aliens lusting after your supplies of titanium. As usual, you are the planet's last hope and with you go the remaining resources and the last six ships. A nicely drawn title scrolls up to reveal a whole set of options – volume control, skill level, speed, start on different level – which requires a password – colour or mono screen switch, screen resolution and sound volume control.

From there you move to the map and icon display which give you further options such as a choice between keyboard and joystick, sound on/off and start game. There's also current and high scores plus number of ships and credits remaining. There are two levels for each of the four scenarios and after each scenario is completed you are returned to this screen.

You get six ships and three credits at the start, the credits allowing you to restart from the point where you lost your last ship. If you use the passwords to jump the levels you don't get any credits.

The game play area is a fairly thin strip across the top of the screen – and the terrain scrolls from right to left. You can manouevre your ship from the left of the screen to two thirds of the way to the right plus up and down using the usual control keys. The game is quite simple: Fly along shooting the aliens, blowing up various parts of the terrain as necessary, avoiding missiles and bullets, flying carefully around various structures and finally blowing up the big thing at the end.

For every 10 aliens you remove you get a bonus pod which adds to your fighter's capabilities – rapid fire lasers, battering ram, gun droid and missiles. The gun droid is a little ball that tags along with you and fires a stream of bullets of its



the keys is essential. If you block a key you may as well give up on a screen or use the remaining time to explore the maze and work out a strategy for next time.

Black boulders are just obstacles and can be pushed out of the way, but be careful not to push one into a position that will block you later.

A lot of useful information is provided, probably the most important being the scanner map which is constantly updating. This shows your position in the maze together with all the diamonds and green boulders. Unfortunately it doesn't show things like the black boulders, lock, keys or monsters. Once you have collected four bottles of magic potion you gain an extra life.

Perplexity is very compulsive and will keep you trying to improve on your last performance.

Louise Colinson

Sound	*7*
Graphics	*8*
Playability	*9*
Value for money	*9*
Overall	*8*

own. Missiles are fired off at regular intervals from your ship and are much more destructive than bullets – you really need these last two once you reach the final object.

The first two levels are based around the alien spaceship into which you fly. You must get through all the defences consisting of gun towers and forcefield generators to reach the fortress at the end.

Next up is the asteroid base which is similar in content but also houses rock-throwing mushrooms. After this comes the surface of the alien planet and its cave system and things begin to get even more outlandish.

Finally there's the alien beast. You actually travel through it and there's quite a surprise awaiting you in this section.

This game is a very good attempt to copy the sideways scrolling games commonplace on 16 bit machines. However the implementation is not as clean as it could be: Where one sprite crosses another you get a black corner, and the whole playing area is being software scrolled. This results in the graphics getting flickery when a lot is happening. Having said that it's a good game and fun to play.

Definitely worth getting hold of.

Geoff Brown

Graphics	*7*
Sound	*8*
Playability	*9*
Value for money	*9*
Overall	*8*

IT'S MAGIC

...out for a spell

Price: £2.99 (tape) mail order only
Supplier: Central Computing, 61
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THIS two-part text adventure is set 200 years in the future when a career as a showbiz personality or pop singer no longer appeals to school-leavers. They want to be magicians – but more like Merlin than Paul Daniels.

To do this they must join the International Union of Magicians. However, the Union doesn't want a sudden influx of semi-skilled members, so it decided that all prospective candidates would have to earn their nomination by learning the 14 basic spells.

This put them on the short list. The handful of successful candidates would be announced at the annual banquet and only those present would be admitted to the elite band of magicians.

The first part starts at the school gates where you are assaulted by the leader of the Mob.

You are told you must return later to participate in the ritual book-burning ceremony or the Mob will ensure that you never get to the Magicians' Ball.

Your first task is to find your schoolbooks and return for the bonfire so that the Mob won't bother you again, leaving you free to search for spell plaques hidden around a town that boasts a shopping centre, library, police station, wax museum, bad housing, and a park.

Provided you remembered to examine the books you will be on the first rung of the ladder. Your next task is to enlist the help of your girlfriend, Diane, who wears a *Just Seventeen* T shirt – which is a lie 'cos she's only 16.

Now you're ready to do your bit for nature conservation, with just rewards, as Woody will save you several times if necessary. But make too many silly mistakes and he won't bother. The spells are in capital letters on plaques, and to learn them you must read the plaque.

The name of each spell is self-explanatory – for example bounce allows you to jump higher and alien changes you or something into something else.

Some spells are simply cast, while others have to be cast at something or someone, while *spelling mistakes* can be cancelled with the reverse spell, although in the first part just touching a plaque will suffice.

The emphasis in part one is on learning the spells, the easier ones being used to discover the more elusive ones.

I thoughtlessly cast grav without a roof over my head and I soon discovered that aliens can't read plaques – at least in the beginning. It was slow but rewarding progress from *another annoying school-leaver* to *on the verge of membership*.

Part two begins with you dreaming about Universal Magic. Poor Woody got the chop, but Diane is still with you. As you are no longer a novice your spells are more effective, allowing you to cast while an alien.

In contrast to the first part, the problems must now be solved in a certain order.

The map for this part can be split into three sections – up to the wood, the brick building complex and, finally, the countryside and banquet hall. It's easy to find a quick way back to the brick building, but there's a slightly less obvious method for returning to the asylum.

The loading screen for part one could damage your eyesight but part two has an animated picture of a wizard. Pressing the spacebar a few times sends him into manic mode.

The programming is very user friendly and inputs such as *Ask Diane for help* are understood, as are multiple commands separated by a full stop or comma.

A very comprehensive help sheet is available if you send an sae to Central Computing.

In part one Status reminds you which spells you know and can cast safely, as well as any that are active.

Part two replaces this with an indication of whether the location is inside or outside.

Most adventurers are familiar with the save and load to tape facility but not so recognisable are the store and recall commands.

They are rare on the BBC Micro, but commonplace on other micros and allow you to save your current position, giving instant recall.

It's amazing how audacious this makes your adventuring!

Author Simon Maren has written an absorbing adventure about enterprising youth. Stubbornly refusing to be conformist, his storyline and quirky puzzles are refreshingly original, often with a sideways swipe at more conventional adventures.

Barbara Gibb

Presentation	*6*
Atmosphere	*9*
Graphics	*n/a*
Value for money	*9*
Overall	*8*

That crowns it all

Hac Man walks through solid walls to reveal some of the hidden treasures of the Citadel

Featuring...

Citadel: Locations of crowns and crystals
Startrader: Locations of Armageddon Device segments – tip
Hoverbod: Extra lives/level jump pokes
Plan B: Infinite energy/ammunition and extra keys – pokes for compilation disc version
PLUS Summary of the March 1988 to February 1989 Hac-Man columns

WELCOME to another mixed bag of the best hints, tips, cheats and pokes for all BBC and Archimedes arcade games. If the craze for arcade-adventures in recent years could be tracked back to a single progenitor, arguably it would be Superior Software's *Citadel*.

It is certainly one of the games that I have most enjoyed playing, so I was quite surprised to notice from my recently-compiled Hac Man index – part two of which appears in this issue – that I have only ever mentioned it in one previous column.

Both the letters page of *The Micro User* and I have received many queries about Citadel. One of the most recurrent has been a request for help in finding the three crowns, one of which can be seen on the title page.

The fact that so many readers have experienced problems in finding the crowns might be because two of them are hidden in rooms linked to the main game by invisible passages in apparently solid walls.

I fail to see how any normal player could ever be expected to find them because I cannot imagine that many people go around 100 rooms of an arcade-adventure jumping at the nearest wall just to see what will happen.

Nevertheless, on with the hunt: The first crown – which is red/magenta – is located just off the bottom of the well shaft at map reference 3,-4.

Make sure that you have pulled the lever that lowers the level of the water in the well, and that you are carrying the snowflake. Go down to the bottom of the well shaft – map reference 2,-4.

You will find that the water there has frozen over, so drop the snowflake on the pedestal to make sure it stays that way. Jump up the ledges on the right-hand side and you will find another screen, with the crown on the far side. The two hidden rooms are at map reference -8,0 – just to the left inside the Witch's House – and at -3,-1 – just to the left of the cellar. To get the yellow/magenta/red crown in the Witch's House you must first place a trampoline on the pedestal just outside her house.

Bounce on the trampoline until you can get on to the roof, then jump down the chimney. Make your way straight left to the top of the ladder, taking care to shoot the monk who homes in on you as soon as you approach. From the top of the ladder, press left and jump: You should find yourself inside the wall. Walk straight through to find the crown. To get the green/yellow crown in the cellar you must be carrying one of the trampolines. Work your way through the water and drop it on the pedestal on screen-2,-1. Bounce on the trampoline until you have gained sufficient height, then jump off and aim for the **2** of your map position as displayed on the screen. If you hit it squarely you should, as before, find yourself inside the ceiling. Walk along this invisible passage to find the last crown. This, incidentally, is the one that you can see if you let the game run through its demo.

The next most common distress call has been for help in locating the five crystals that are the cornerstones of the entire game. They are located in the freezer, the witch's house, the pyramid, the lab and inside the door marked **C** in the central tower at the top of the castle.

The crystal in the freezer is almost a giveaway and a little logical thinking will soon have it in your grasp. To get the one behind the C door you must start the lift at map location -1,3 and jump from it to land on the central tower. Press Return to enter it. To get the one in the witch's house you will need the skull and the two bones which can be found at map locations -3,5, 3,2

HE EAST PALACE

Storming the Citadel

and -14,-2 respectively.

Proceed as described, evading the monk's attentions as before, but this time climb down the ladder. Make your way across to the right-hand side of this screen and walk through into the witch's domain.

As soon as you appear in this room the witch will start to fly towards you, so tarry not. Jump over the cauldron with each ingredient in turn: This has the effect of dropping it in the cauldron.

When you have mixed the three ingredients retreat to the left-hand side of the screen and wait for the witch to come for you. As she passes over the cauldron she will disappear in a ball of flame, leaving the way clear. Go down and you will find the crystal.

The yellow surface area of the pyramid contains a hidden maze. Once you have got through it you will need the two Sphinx heads to freeze the mummies. Drop the green idol from the mountains and you will find that you are now carrying a crystal.

To get the one in the lab, you must first start the well wheel. Next fire the cannon, using the cannon ball and the gunpowder – the pink pot marked with a **P**. This will break down a wall, allowing you to get to the crystal.

From here, the finish of the game is not far away...

From outer space

To add an international flavour to the column, here are a few useful cheats for Bug-Byte's Plan B, which come from Bent Melby of Frederiksberg, Denmark:

These pokes are for the version that appears on Bug-Byte's own compilation disc. If you own the game on cassette and you want to cheat, look no further than the first edition of Impact's Cheat It Again Joe. Anyway, to kick Bent's pokes into action, put the disc into the drive and type:

```
*LOAD PLANC
```

Press Return and then type in any or all of the following pokes – depending on the nature of the help you require – pressing Return after each line:

Poke	Command
Infinite energy	?&3F6F=&60
Infinite ammunition	?&48AB=&4C:?&48AC =&65:?&48AD=&40
Extra keys	?&3F01=x, where x is the required number of keys.

Finally, type CALL &4CB3 to start the game with your chosen modifications in place. The only point to note is that you should not be too greedy when selecting the number of keys with which you intend to start. If you are carrying 255 at any point the number will be reset to zero if you collect one more. Bent says around 40 should be more than sufficient to ensure success.

➤

The second great year

To continue with the Hac Man index started last month, here is a summary of the columns of the second year – March 1988 to February 1989:

March 1988
Around the World in 40 Screens passwords
Airwolf Master conversion used as an example of methods of defining VDU23 character definitions
Paperboy Master conversion
Crazee Rider enhanced version – 5.25in disc – to Solidisk FourMeg board conversion

April 1988
Codename:Droid solution and pokes – tape, 5.25in disc and Master Compact versions

May 1988
Stryker's Run infinite or extra lives and bug fix – Play It Again Sam Master Compact, standard and enhanced versions
Thrust infinite lives and fuel – Play It Again Sam Master Compact
Grand Prix Construction Set fix to allow user tracks to be saved – Master Compact version
Discussion of compatibility of Master Compact games on ADFS machine with 3.5" drive
Codename:Droid on Play It Again Sam II feature
Codename:Droid vs **Spellmaster** fix for clash

June 1988
Stryker's Run infinite and extra lives – Play It Again Sam 5.25in disc standard and enhanced versions
Thrust infinite lives and fuel – Play It Again Sam tape and 5.25in disc
Mineshaft Master conversion
Dunjunz mapper
Starquake addendum to transporter codes
Elite back issues blurb
Zarch cheat mode
Apologies for errors in April's Master Compact software on other machines article and cheat for Stryker's Run

July 1988
Barbarian feature
Summer Olympiad feature
Bolo feature
Repton Thru Time feature
Pipeline feature
Exile feature
Daxis feature
Condition:Red passwords
Repton 2 pokes – original and Play it Again Sam tapes and discs

August 1989
Life of Repton complete passwords
AMX Pagemaker and **Stryker's Run** clash

Life of Repton

Acorn Teletext Adaptor and Codename:Droid, Psycastria, Sphere of Destiny or Impact clash
Arkanoid level jump and start on last level cheats
Crazee Rider level jump
Ransack extra lives and level jump
Omega Orb extra lives
The Living Daylights hint

September 1988
Arkanoid cassette infinite lives
Kourtyard cheat mode
Impact cheat mode
Vegas Jackpot cassette Master conversion
Superman feature
Spy vs Spy feature
Citadel hints + feature
Explanation of printed errors/problems plus warning not to save on to original discs

Codename: Droid

October 1988
Bonecruncher tape loading problems plus passwords
Thunderstruck solution
Rocket Raid cheat

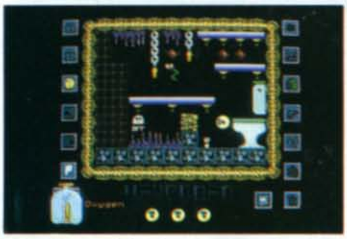
November 1988
Bonecruncher disc extra lives and feature
Anarchy Zone passwords
Zarch high score
Uridium hints
Spellbinder hint
Saracoid cheat mode
Star Wars cheat
Ransack infinite lives
Palace of Magic invulnerability – tape, 5.25in disc and Compact disc versions

December 1988
Christmas releases: **Play It Again Sam 3 and 4, By Fair Means or Foul, Exile, A Question of Sport, Repton Infinity, Superman, Summer Olympiad, Circus Games** and **Mayday Squad**
Way of the Exploding Fist feature and Master conversion
Lothlorien information
Hac Man hi-score table

January 1989
Bolo feature
Maltese Joe's Pool Challenge feature
FireTrack II feature
Ravenskull level 1 solution (part 1)

February 1989
Rogue for the Master 512 co-processor
Clogger vs **Exmon II** conflict resolved
Ravenskull level 1 solution (part 2)
Way of the Exploding Fist tape to Master conversion
Labyrinth infinite lives

Hover – no bover



Alex Strong of Southampton has sent me a couple of useful tips for Minerva's **Hoverbod** that will allow you to select your start level and the number of lives you require. To enter them, proceed as follows. Exit from the desktop to Basic and type:

```
LOAD"GAME"
LIST 2
LIST 190
```

Change the variable *LEVEL%* in line 2 so that it contains the number of the level on which you wish to start – this can be any number between 1 and 9. Similarly, change the value of *LIVES%* in line 190 to the number of lives with which you wish to start the game. This should be between 1 and 5. Higher values work perfectly but corrupt the screen display.

Safe from Armaggeddon

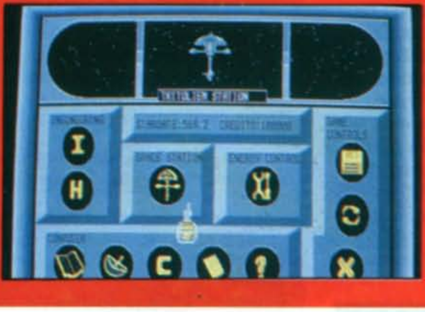
A3000 owner Christopher Jordan of Walton-on-Thames, Surrey has a tip that I'm sure will be of use to players of **Startrader** from Gem Electronics.

The purpose of the game is to locate the nine segments of the de-activation code for an Armageddon device set by the evil Kargans, to quote my colleague Terry Blunt in his review. It's a pretty standard scenario, but this should not be held against it.

Books which give the location of one of these segments can be bought – for a mere ten million credits each – from any planet that has a space station factor of 20. Each planet offers only one book, so you must find nine such planets and, under normal circumstances, accumulate a total of ninety million credits – not an easy task.

However, Christopher's tip allows you to discover the locations of two or more segments once you have sufficient funds to buy just one book.

First make ten million credits in the usual way and find a planet that has a space station factor of 20. Save the game, dock with the space station and buy the book that gives you the location of one of the segments and make a note it. Leave the space station and restart the game. If you then reload the data file that you saved just before you docked, you will still have your ten million credits, plus the location of one of the segments.



You can now leave this space station and find another of a similar rating. When you do, proceed as before: Save your position, enter the station, dock, buy the book, note the position of this segment, restart the game and blast off again.

It's easy, but it certainly sounds as though it could spoil the fun.

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Data basics

Make the most of your micro with this powerful database system

by Richard Hul

DATABASE programs come in many different guises, from simple, dedicated name and address files to the total versatility and fully programmable capabilities of InterBase. Now here's a program that lies in between – it has a simple design but also a programmable front end to make life easier.

The listing here is basically a database manager, which means that it can store and retrieve records but has no idea what that data is for.

To make this clearer: A dedicated name and address database can ask you to input a name, an address and a telephone number – the program has details as to what the data that it holds actually means.

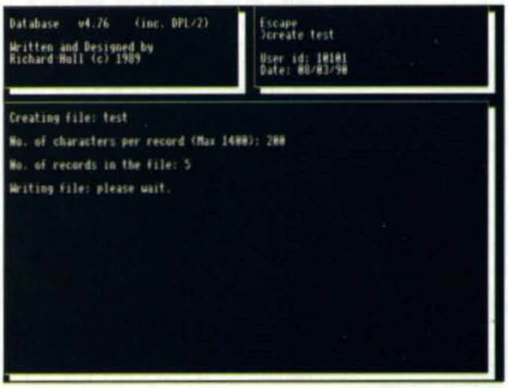
But a database manager will store and retrieve only as instructed – and the data has no meaning.

It is up to you to add that using the built-in programming language.

The advantage of this procedure is that you can design one front end that holds names and addresses, another to store your record collection, a third to keep account transaction records – all using the same database manager.

However, in order to find individual records there must be a special key field unique to each. This is what the database manager uses to locate each record within the file.

The front end itself is programmed from a language built into the database manager that's a simple cross between Basic and Assembly language.



```
Database   v4.76    (inc. DPL/2)

Written and Designed by
Richard Hull (c) 1989
```

```
Escape
)create test

User id: 10101
Date: 08/03/90
```

```
Creating file: test

No. of characters per record (Max 1400): 200

No. of records in the file: 5

Writing file: please wait.
```

National Curriculum

Certain areas of the National Curriculum require knowledge of how to enter and retrieve information from a database.

This program and its associated language provide a simple method of reaching these targets.

Program features

- Powerful programming language.
- Use of templates to assist entering record data.
- Spool data to an ascii file depending on matching with a string.
- Numeric calculations.
- File datestamping

Limitations

Due to its length and the commands used this program will only function on a Master or Compact. It cannot work on tape systems.

How to use it

Type in the listing and ensure you've made no mistakes using the checksums, then save and run it.

Remember this program is on this month's subscription disc and there's also a demo data file based on a diary.

You are presented with the main Mode 0 screen with three boxes. The top left one contains the program name, the one top-right is where command line entry occurs and the main window is where all output and the main record input takes place.

Let's create a test file so you can see how it works in direct command mode. Enter:

```
CREATE Test
```

You are prompted for the maximum size of the record in bytes and the number expected.

All the data in a record is held as one free-form field and you can structure it as you wish.

Enter 200 for the byte size and 5 for the number of records, pressing Return after each. There's a short pause while the file is prepared.

When the file is ready you need to open it. Type:

```
OPEN Test
```

After the disc has whirred there is a request for your five-digit user number – this is most appropriate in a network environment – and the current date. You are ready to add data using:

```
WRITE
```

If you want to add more than one record specify the number after the command. You are now asked for a key reference for this record, which must be unique. You can now enter data in the main area of the screen, perhaps a name and address. Exactly where you put the information in the screen area is up to you.

When finished press Escape and the program will scan the text area. You can abort by pressing Escape again before the cursor reaches the end. Finally the record is written to the file.

To look at a specific record you need to know its key reference and type:

```
READ key ref
```

However you can search the whole file for either a string in the key reference or in the main text itself. Close the file using *CLOSE*.

So that's the basics of using this command line-controlled database. Next month we'll show you how to can write complete programs to control it and use it to its best advantage.

➤

Database jargon

Database: All the data about a particular subject held together in one file. For example, all the names and addresses in a name and address database.

Record: A set of related data about one item within a database. For example, the name and address of one person.

Field: One particular piece of information in a record, say surname or post code. However in this program all the data for each record is held in one free-form field.

➤

```
10 REM > Database
20 REM by Richard Hull
30 REM (c) The Micro User
40 :50 MODE 128:intclock=FALSE:REM
internal real time clock ?
   60 DIM store% 1500,cb% 256,code% 25,v
ar% 256,p$(600),lb$(50),lb%(50)
   70 PROCscreen:PROCassemble:ON ERROR P
ROCerr
   80 REPEAT:PROCtwind(2):VDU 3,31,0,yp%
,62
   90 UNTIL EVAL("FN"+FNexec(FNinput(&B2
))):MODE 131:END
  100 :
  110 DEF PROCscreen:yp%=0:ch%=0:prime%=
0:ovf%=0:tm%=0:ptr%=3:lf%=1:kf%=FALSE
  120 asc%=0:RESTORE 380:FOR k%=0 TO 2:R
EAD x%,y%,a%,b%:PROCbox(x%,y%,a%,b%):NEX
T
  130 PROCtwind(1):PRINT"Database   v4.7
6    (inc. DPL/2)"
  140 PRINT'"Written and Designed by"'"R
ichard Hull":d%=FNreset:ENDPROC
  150 DEF PROCtwind(n%):RESTORE 390:FOR
k%=1 TO n%:READ x%,y%,a%,b%:NEXT
  160 VDU 28,x%,y%,a%,b%:ENDPROC
  170 DEF PROCbox(x%,y%,a%,b%):MOVE x%,y
%:DRAW a%,y%:DRAW a%,b%:DRAW x%,b%
  180 DRAW x%,y%:MOVE x%+16,b%:MOVE a%+1
6,b%:PLOT 85,x%+16,b%-16
  190 PLOT 85,a%+16,b%-16:MOVE a%+16,y%-
16:PLOT 85,a%,b%-16:PLOT 85,a%,y%-16
  200 ENDPROC
  210 DEF PROCos($cb%):PROCcall(&FFF7):E
NDPROC
  220 DEF FNinput(n%):!cb%=cb%+&10:cb%?2
=n%:cb%?3=32:cb%?4=127
  230 A%=0:PROCcall(&FFF1):=$(cb%+&10)
  240 DEF FNexec(text$):yp%=VPOS:IF text
$="" OR LEFT$(text$,1)="\" :="cr"
  250 $cb%=text$:c%=0:REPEAT:c%?cb%=c%?c
b% OR &20:c%=c%+1:UNTIL c%?cb%<33
  260 $cb%=LEFT$($cb%,INSTR($cb%,"  ")-1
):c%=c%+1
  270 IF ?cb%=42 c%=1:PROCtwind(3):CLS:P
ROCos(FNstr):="cr" ELSE :=$cb%
  280 DEF PROCerr:VDU 3:PROCos("fx21,3")
:PROCtwind(2):VDU 31,0,yp%
  290 IF ERR=29 OR ERR=30 PRINT '"No suc
h command"; ELSE REPORT
  300 PRINT:yp%=VPOS:ENDPROC
  310 DEF FNfilopen:PRINT '"No file open
":=FNerr
  320 DEF FNerr:yp%=VPOS:fnd=TRUE:=FALSE
```

SUBSCRIBE NOW!
If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

```
  330 DEF FNreset:VDU 2,1,27,1,64,1,27,1
,81,1,76,3:=FALSE
  340 DEF PROCclear:FOR d%=store% TO sto
re%+1495 STEP 4:!d%=0:NEXT:ENDPROC
  350 DEF FNclock:A%=14:?cb%=1:PROCcall(
&FFF1):=STR$~(cb%?2)+STR$~(cb%?1)+STR$~(
cb%?0)
  360 DEF FNwait(t):t=t*100:ti%=TIME:REP
EAT:UNTIL ti%+t<=TIME:PROCos("fx21"):=FA
LSE
  370 DEF PROCcall(addr%):X%=cb% MOD256:
Y%=cb% DIV256:CALL addr%:ENDPROC
  380 DATA 0,1023,600,800,640,1023,1240,
800,0,760,1240,20
  390 DATA 1,5,36,1,41,5,76,1,1,30,76,9
  400 :
  410 REM ## Options ##
  420 DEF FNquit:d%=FNclose:=TRUE
  430 DEF FNcr:=FALSE
  440 DEF FNcls:FOR n%=2 TO 3:PROCtwind(
n%):CLS:NEXT:yp%=0:=FALSE
  450 DEF FNcat:PROCtwind(3):CLS:PROCos(
"INFO *"):=FALSE
  460 DEF FNcalc:PRINT ;EVAL FNstr:yp%=y
p%+1:=FALSE
  470 DEF FNcreate:f$=FNstr:PROCtwind(3)
:CLS:PRINT"Creating file: ";f$
  480 PRINT '"No. of characters per reco
rd (Max 1400): ";:REPEAT
  490 PRINT TAB(41,2)SPC(4)TAB(41,2);:ch
ar%=VAL(FNinput(4))
  500 UNTIL char%>0 AND char%<=1400:char
%=15+76*(char% DIV 76+1)
  510 PRINT '"No. of records in the file
: ";:REPEAT:PRINT TAB(28,4)SPC(4)
  520 PRINT TAB(28,4);:len%=VAL(FNinput(
4)):UNTIL len%>0:ch%=OPENOUT(f$)
  530 PRINT #ch%,char%:PRINT TAB(0,6)"Wr
iting file: please wait."
  540 EXT #ch%=len%*char%+5:d%=FNclose:P
ROCtwind(2):VDU 31,0,yp%:=FNdatestamp
  550 DEF FNdatestamp:f$=FNstr:PROCwrt:P
ROCwrt_id_dt(f$,i$+"D",d$):=FNerr
  560 DEF PROCwrt:PRINT '"User id: ";:yp
%=VPOS:i$=FNinput(5)
  570 IF intclock d$=FNclock:ENDPROC ELS
EPRINT"Date: ";:yp%=VPOS:d$=FNinput(8)
  580 d$=LEFT$(d$,2)+MID$(d$,4,2)+RIGHT$
(d$,2):ENDPROC
  590 DEF PROCwrt_id_dt(f$,i$,d$):$(cb%+
&12)=f$+CHR$13:!cb%=cb%+&12
  600 cb%!2=EVAL("&"+i$):cb%!6=EVAL("&"+
d$):cb%!&E=3:A%=1:PROCcall(&FFDD):ENDPRO
C
  610 DEF PROCrd_id_dt(f$):$(cb%+&12)=f$
+CHR$13:!cb%=cb%+&12:A%=5
  620 PROCcall(&FFDD):id$=STR$~cb%!2:dt$
=RIGHT$("000000"+STR$~cb%!6,6):ENDPROC
  630 DEF FNopen:d%=FNclose:f$=FNstr:ch%
=OPENUP(f$)
  640 IF ch%=0 PRINT '"Not found":=FNerr
  650 PROCwrt:PROCrd_id_dt(f$):yp%=VPOS
  660 IF RIGHT$(id$,1)<>"D" PRINT'"Not a
 Datafile":d%=FNclose:=FNerr
  670 PROCtwind(3):CLS:PRINT"File ";f$;"
 last opened on ";
  680 PRINT LEFT$(dt$,2)"/"MID$(dt$,3,2)
"/"RIGHT$(dt$,2);
  690 PRINT" by User ";RIGHT$("00000"+LE
FT$(id$,LENid$-1),5);"."
  700 PROCwrt_id_dt(f$,i$+"D",d$):INPUT
#ch%,char%:len%=(EXT #ch%)-5
  710 rec%=len%/char%:prime%=FNprime(rec
%):=FALSE
  720 DEF FNclose:PROCclear:prime%=0:ch%
=0:CLOSE #ch%:=FALSE
  730 DEF FNhash(t$):t$=FNconv(t$):n%=0:
FOR t%=1 TO LENt$
  740 n%=n%+ASC(MID$(t$,t%,1))*ASC(MID$(
t$,t%-1,1)):NEXT:=n% MOD prime%
  750 DEF FNprime(t%):REPEAT:t%=t%-1:d%=
1:REPEAT:d%=d%+1:UNTIL t% MOD d%=0
  760 UNTIL t%=d%:=t%
  770 DEF FNread:LOCAL ovf%,g$,addr%:err
%=FALSE:IF prime%=0 :=FNfilopen
  780 ovf%=-1:g$=FNstr:addr%=FNhash(g$):
REPEAT:ovf%=ovf%+1
  790 PROCgrpr(addr%,char%,3):UNTIL FNco
nv($store%)=FNconv(g$) OR $store%=""
  800 IF $store%="" PRINT '"Record not f
ound":yp%=VPOS:err%=TRUE:=FALSE
  810 PROCtwind(3):CLS:IF kf% VDU ptr%
  820 PRINT"Key field: ";$store%;TAB(27)
;"Overflow: #";ovf%:VDU ptr%
  830 PRINT:CALL print:IF asc%<>0 PROCsp
ool
  840 FOR n%=1 TO lf%:VDU 1,13:NEXT:VDU
3:=FALSE
  850 DEF FNwrite:IF prime%=0 :=FNfilope
n
  860 n$=FNstr:IF n$="" n$="1"
  870 FOR s%=1 TO VAL(n$)
  880 PROCtwind(3):CLS:PRINT"Key field:
";:g$=FNinput(14):addr%=FNhash(g$)
  890 ovf%=0:REPEAT:PROCgrpr(addr%,15,3)
  900 IF FNconv($store%)<>FNconv(g$) AND
 !store%<>0 ovf%=ovf%+1
  910 UNTIL FNconv($store%)=FNconv(g$) O
R !store%=0 OR EOF #ch%
  920 IF EOF #ch% PROCtwind(2):VDU 31,0,
yp%:PRINT '"No room in file":=FNerr
  930 PRINT TAB(27,0)"Overflow: #";ovf%T
AB(70,0);s%'
  931 IF tm% VDU28,1,31,76,9:PROCos("pri
nt "+tm$):PROCtwind(3)
  940 PROCeditor(char%-15):PROCgrpr(addr
%,char%,1):NEXT:=FALSE
  950 DEF FNerase:d%=FNread:IF err% :=FA
LSE
  960 PROCtwind(2):VDU 31,0,yp%:PRINT '"
Are you sure ? ";
  970 IF FNconv(FNinput(3))<>"yes" PRINT
 '"Aborted":=FALSE
```

MICRO MEMORIES

Facts and tips you may have forgotten...or never known

ACCIDENTALLY saving a file on top of another on a DFS format disc is simple to do and yet it's so easy to prevent. All you have to do is enter:

```
* ACCESS filename L
```

The file is then locked and, until it is unlocked, you can't save a file with the same name or erase it. Remember though, you can still format the disc, so the file is not completely safe. And as there's always a risk that your disc may become faulty you should always keep a backup.

To unlock a file you enter:

```
* ACCESS filename
```

```
  980 FOR n%=0 TO char%-1:n%?store%=0:NE
XT:PROCgrpr(addr%,char%,1):=FALSE
  990 DEF FNedit:d%=FNread:IF err% :=FAL
SE
 1000 PROCeditor(char%-15):PROCgrpr(addr
%,char%,1):=FALSE
 1010 DEF PROCgrpr(addr%,no%,wr%)
 1020 PROCgbpb(ch%,store%,no%,5+(addr%+o
vf%)*char%,wr%):ENDPROC
 1030 DEF PROCgbpb(?cb%,cb%!1,cb%!5,cb%!
9,A%):PROCcall(&FFD1):ENDPROC
 1040 DEF FNconv($cb%):FOR n%=0 TO LEN($
cb%)-1:n%?cb%=n%?cb% OR &20:NEXT
 1050 :=$cb%
 1060 DEF FNchar:A%=135:=(USR &FFF4 AND
&FF00) DIV &100
 1070 DEF PROCeditor(c%):depth%=2+c% DIV
 76:PROCos("fx4,1"):PROCos("fx229,1")
 1080 IF depth%<20 PRINT TAB(0,depth%)ST
RING$(76,"=");
 1090 x%=0:y%=2:VDU 31,0,2:REPEAT:g%=GET
:IF g%>135 AND g%<140 VDU g%-128
 1100 IF VPOS<2 VDU 10 ELSE IF VPOS>dept
h%-1 VDU 11
 1110 IF g%=13 PRINT
 1120 IF g%=127 VDU 8,32,8
 1130 IF g%>31 AND g%<127 VDU g%
 1140 UNTIL g%=27:PROCos("fx4"):PROCos("
fx229"):$store%=g$+CHR$13:n%=15
 1150 VDU 31,0,2:REPEAT:n%?store%=FNchar
:n%=n%+1
 1160 VDU 9:UNTIL n%=char%:?(store%+char
%)=&FF:ENDPROC
 1170 DEF FNtemplate:tm$=FNstr:IF FNconv
(tm$)="off" tm%=0:=FALSE
 1180 tm%=OPENIN(tm$):CLOSE #tm%
 1190 IF tm%=0 PRINT '"Template file not
 found":yp%=VPOS
 1200 :=FALSE
 1210 DEF FNbuild:tm$=FNstr:IF prime%=0
:=FNfilopen
 1220 PROCtwind(3):CLS:PRINT"Building te
mplate file: ";tm$:g$=""
 1230 PROCeditor(char%-15):tm%=OPENOUT(t
m$):n%=15:REPEAT
 1240 BPUT #tm%,n%?store%:n%=n%+1:UNTIL
n%?store%=&FF:CLOSE #tm%:=FALSE
 1250 DEF FNprinter:ptr%=2:IF FNconv(FNs
tr)<>"on" ptr%=3:=FALSE
 1260 PRINT '"Print key ref. (y/n): ";:R
EPEAT:PROCos("fx21"):k%=GET OR &20
 1270 UNTIL k%=110 OR k%=121:VDU k%:kf%=
(k%=121):PRINT ''"No. of LF: ";
 1280 x%=POS:y%=VPOS:REPEAT:PRINT TAB(x%
,y%)CHR$32;CHR$8;:lf%=VAL(FNinput(2))
 1290 UNTIL lf%>=0:=FNerr
 1300 :=FALSE
 1310 DEF FNsearch:se%=FALSE
 1320 DEF FNextract:se%=TRUE
 1330 IF prime%=0 :=FNfilopen
 1340 PROCtwind(3):CLS:f$=FNstr
 1350 PRINT"Key references will be spool
ed to: ";f$'
 1360 PRINT"String to be searched for: "
;:target$=FNconv(FNinput(14)):PRINT
 1370 PRINT"Search concentrated on key r
eference or record data (k/r): ";
 1380 REPEAT:w%=GET OR&20:UNTIL w%=107 O
R w%=114:VDUw%:IFse% VDU 28,1,30,76,15
 1390 ch2%=OPENOUT(f$):CLS:FOR addr%=0 T
O rec%-1:PROCgrpr(addr%,char%,3)
 1410 IF w%=107 PROCkrsearch ELSE PROCrd
search
 1420 NEXT:CLOSE #ch2%:CLS:PRINT '"Searc
h complete.":=FALSE
 1430 DEF PROCkrsearch:IF INSTR(FNconv($
store%),target$) OR (target$="*" AND !st
ore%<>0) PROCkrfound:ENDPROC ELSE ENDPRO
C
 1440 DEF PROCkrfound:PRINT"Match found,
 Key ref.: "$store%
 1441 PRINT #ch2%,$store%:IF se% ENDPROC
 1450 PRINT'"View record/Next match (v/n
): ";:REPEAT:PROCos("fx21"):l%=GETOR&20
 1460 UNTIL l%=110 OR l%=118:VDU l%:IF l
%=118 PROCrdrec($store%)
 1470 CLS:ENDPROC
 1480 DEF PROCrdsearch:IF !store%=0 ENDP
ROC
 1490 fnd%=FALSE:n%=15:REPEAT
 1500 IF (n%?store% OR &20)=ASC(LEFT$(ta
rget$,1)) fnd%=FNmatch
 1510 n%=n%+1:UNTIL fnd% OR n%=char%:IF
fnd% PROCkrfound
 1520 NEXT:ENDPROC
 1530 DEF FNmatch:f%=0:FOR o%=1 TO LEN(t
arget$)
 1540 IF (?(n%+store%+o%-1) OR &20)=ASC(
MID$(target$,o%,1)) f%=f%+1 ELSE o%=LEN(
target$)
 1550 NEXT:IF f%=LEN(target$) :=TRUE ELS
E :=FALSE
 1560 DEF FNscan:IF prime%=0 :=FNfilopen
 1570 PROCtwind(3):CLS:f$=FNstr:ch2%=OPE
NIN(f$):REPEAT:CLS:err%=FALSE
 1580 INPUT #ch2%,key$:PRINT"Key ref.: "
key$;"   Skip or read (s/r): ";
 1590 REPEAT:PROCos("fx21"):k%=GET OR &2
0:UNTIL k%=114 OR k%=115:VDU k%
 1600 IF k%=114 PROCrdrec(key$)
 1610 UNTIL EOF #ch2% OR err%:CLOSE #ch2
%:=FALSE
 1620 DEF PROCrdrec($(cb%+c%)):d%=FNread
 1630 PRINTTAB(48,0)"Press SPACE for nex
t match";:PROCos("fx21"):d%=GET:ENDPROC
 1640 DEF FNutility:f$=FNstr:f%=OPENIN(f
$):CLOSE #f%
 1650 IF f%=0 PRINT '"Utility file not f
ound":=FNerr
 1660 PRINT'"Warning: All open files wil
l"SPC(8)"now be closed."
 1670 PRINT '"Press Return to continue";
:PROCos("fx21"):REPEAT:UNTIL GET=13
 1680 PROCos("key 0 CHAIN "+CHR$34+f$+CH
R$34+"|L|M")
 1690 PROCos("fx138,0,128"):=TRUE
 1700 DEF FNascii:ascfnam$=FNstr:asc%=0
 1710 IF FNconv(ascfnam$)="off":PRINT '"
Spooling off":=FNerr
 1720 asc%=OPENOUT(ascfnam$):CLOSE #asc%
```

➤

Get it right ✓

```
  10 =    0 0    450 = AF82 4    890 = A065 F   1320 = F3BC C   1760 =   F7 5
  20 =    0 0    460 = B1D1 9    900 =  1DA B   1330 = F917 C   1770 =  829 C
  30 =    0 0    470 = 96ED 2    910 = 946C 0   1340 = 312E 2   1780 = 5E96 E
  40 = 9719 9    480 = 9EB9 6    920 = EE56 9   1350 = E6A9 8   1790 = 4BFE 0
  50 = E79B 7    490 = 5442 7    930 = 82F4 3   1360 = 6B56 2   1800 = 8B74 5
  60 = CCF1 E    500 = 6485 A    931 = 5661 D   1370 = F006 9   1810 = FA1E 9
  70 = 11C1 0    510 = 3723 8    940 = 894A A   1380 = 779F 5   1820 = 5B32 E
  80 = 1F8C 9    520 = 344E 0    950 = 279C 6   1390 = ED99 8   1830 = 9B87 E
  90 = 9BD8 0    530 = A571 4    960 = E79C 4   1410 = B2BD E   1840 = 16AB 8
 100 = 9719 C    540 = C00C B    970 = EF65 5   1420 = CFF5 B   1850 = D01F 2
 110 = BCD5 2    550 = 5A49 8    980 = 26B8 F   1430 = 57AA 9   1860 = F424 F
 120 = EAB7 E    560 = F491 6    990 = 1220 E   1440 = D346 4   1870 = DC0D F
 130 = 34CC D    570 = A761 F   1000 = 109B D   1441 = 2B16 F   1880 = 9381 A
 140 = 2AAB 6    580 =  E58 3   1010 = 510D 7   1450 = 8CBF 9   1890 = F8CD 2
 150 = 87FD A    590 = A40B 6   1020 = A7BF E   1460 = 3F00 4   1900 = B876 9
 160 = BDFE 9    600 = 1282 8   1030 = 7598 7   1470 = 9234 2   1910 = 56C8 B
 170 = AD5B B    610 = DCF4 0   1040 = C490 3   1480 = ED16 A   1920 = EA58 D
 180 =  17A F    620 = AE2F 1   1050 = A211 1   1490 = EF37 2   1930 = D7A0 9
 190 = 6631 4    630 = 7695 F   1060 = AC60 D   1500 = 6AFE 5   1940 =  369 9
 200 = ED0F B    640 = 9697 C   1070 = E112 B   1510 =  3E5 C   1950 = 4352 7
 210 = 9C1E 1    650 = 7252 7   1080 =  786 F   1520 = E531 8   1960 = 4A41 C
 220 = 5251 6    660 = 9796 3   1090 = 75A9 F   1530 = 3AEA 5   1970 = 92B8 A
 230 = B70A 2    670 = 1531 D   1100 = 9C9C 5   1540 = DED1 9   1980 = B9CF 2
 240 = 2A7F 5    680 = 7E78 A   1110 = 43E7 7   1550 = 1F1A 7   1990 = E601 4
 250 =  98C 4    690 = 852B 4   1120 = B9ED 1   1560 = FC83 2   2000 = A17E 8
 260 = 7D5D 1    700 = 814B D   1130 = 7AE3 6   1570 =  356 9   2010 = D2FC 6
 270 = DEC1 1    710 = 1D99 3   1140 = 2F8D F   1580 = EAD5 4   2020 = B5D1 F
 280 = 7E8F B    720 = 372F F   1150 = 25B5 9   1590 = 16F9 0   2030 = 406B 7
 290 = 6BC1 A    730 = AA6A 3   1160 = 84B7 B   1600 = 83BE 2   2040 = CC66 3
 300 = 7098 F    740 = 9CF9 0   1170 = 64D8 3   1610 = F6C2 6   2050 = 498F 6
 310 = 4B8B D    750 = 6EBE F   1180 = EFD5 5   1620 = 66DB 1   2060 = 60B3 7
 320 = 59AC F    760 = 9666 5   1190 = ACE5 7   1630 = C3C1 0   2070 = 40D3 4
 330 = 8246 1    770 = 92CC 0   1200 = F424 4   1640 = 126C 3   2080 = 47FE C
 340 = C743 3    780 = 3F44 4   1210 = F7CC F   1650 = D0B9 C   2090 = 175E C
 350 = CC70 0    790 = 21FC 9   1220 = 7FD8 8   1660 = BEF5 4   2100 = 8D7D 3
 360 = 6640 2    800 = 5729 F   1230 = 1C6A 8   1670 = D1DF D   2110 = 3C1A 9
 370 = 2E3C 9    810 = CCEB 4   1240 = 797A 4   1680 = ADB2 D   2120 = 42CD F
 380 = 428D 8    820 = 30DF F   1250 =  A66 3   1690 = C0B8 5   2130 = E149 5
 390 = D348 D    830 = 9845 D   1260 = 88C6 3   1700 = C81F 2   2140 = 1056 A
 400 = 9719 B    840 = F00D 0   1270 = E449 D   1710 = CF38 1   2150 = EC9A 2
 410 =    0 B    850 = B8E2 3   1280 = DA87 7   1720 = EF45 8   2160 = BACA 6
 420 = B147 5    860 = F089 5   1290 =  C2C D   1730 = E4E8 1   2170 = 78F4 2
 430 = 45C9 0    870 = 79E9 0   1300 = F424 B   1740 = D92C 5   2180 = 51D8 4
 440 = 836J 4    880 = 758E 7   1310 = CC11 1   1750 = 41DF 6
```

➤

```
:PRINT '"Spooling records to: "ascfnam$
 1730 :=FNerr
 1740 DEF PROCspool:asc%=OPENUP(ascfnam$
):PROCgbpb(asc%,store%,15,EXT #asc%,1)
 1750 FOR n%=15 TO char% STEP 76:PROCgbp
b(asc%,store%+n%,76,EXT #asc%,1)
 1760 BPUT #asc%,13:NEXT:$store%=STRING$
(76,"=")+CHR$13
 1770 PROCgbpb(asc%,store%,77,EXT #asc%,
1):CLOSE #asc%:ENDPROC
 1780 DEF FNlist:f$=FNstr:ch2%=OPENIN(f$
)
 1790 IF ch2%=0 CLOSE #ch2%:PRINT '"No s
uch reference file":=FNfilopen
 1800 PROCtwind(3):VDU 12,ptr%:PRINT"Lis
ting key ref. file: "f$'
 1810 n%=0:REPEAT:INPUT #ch2%,key$:PRINT
 TAB(n% MOD 4*19)key$;
 1820 n%=n%+1:UNTIL EOF #ch2%:CLOSE #ch2
%:VDU 3:=FALSE
 1830 DEF FNdisplay(i%,j%):PROCtwind(3):
t$=FNstr:PRINTTAB(i%,j%);
 1840 IF $(cb%+c%)="$" t$=CHR$34+t$+CHR$
34
 1850 IF INSTR(t$,CHR$34)=1 PRINTMID$(t$
,2,LENt$-2); ELSE PRINTEVALt$;
 1860 :=FALSE
 1870 DEF FNprogram:f$=FNstr:f%=OPENIN(f
$):res=0
 1880 IF f%=0 PRINT '"Program file not f
ound":CLOSE #f%:=FNerr
 1890 p%=0:REPEAT:p%=p%+1:p$(p%)="":REPE
AT:k%=BGET #f%
 1900 IF k%>31 AND k%<127 p$(p%)=p$(p%)+
CHR$k%
 1910 UNTIL k%=13:IF LEFT$(p$(p%),1)="."
 PROClabel
 1920 UNTIL EOF #f%:CLOSE #f%:p%=0:REPEA
T:p%=p%+1
 1930 UNTIL EVAL("FN"+FNexec(p$(p%))):yp
%=0:PROCtwind(2):CLS:=FALSE
 1940 DEF FNstr:IF LEFT$($(cb%+c%),1)="$
" :=$var% ELSE :=$(cb%+c%)
 1950 DEF FNstring:$var%=EVAL$(cb%+c%):=
FALSE
 1960 DEF PROClabel:lb%=lb%+1:lb$(lb%)=F
Nconv(RIGHT$(p$(p%),LENp$(p%)-1))
 1970 lb%(lb%)=p%:p$(p%)="\":ENDPROC
 1980 DEF PROClbfnd(lb$):f%=FALSE:co%=0:
REPEAT:co%=co%+1
 1990 IF FNconv(lb$)=lb$(co%) f%=co%
 2000 UNTIL f% OR co%=lb%:ENDPROC
 2010 DEF FNjump:PROClbfnd(FNstr)
 2020 IF f%=FALSE PRINT '"Label not foun
d: ";FNstr:=FNerr
 2030 p%=lb%(f%):=FALSE
 2040 DEF FNcompare:c$=EVALFNstr
 2050 IF c$=$var% res=0
 2060 IF c$>$var% res=+1
 2070 IF c$<$var% res=-1
 2080 :=0
 2090 DEF FNbeq:IF res=0 :=FNjump ELSE :
=0
 2100 DEF FNbne:IF res<>0 :=FNjump ELSE
:=0
 2110 DEF FNbpl:IF res=+1 :=FNjump ELSE
:=0
 2120 DEF FNbmi:IF res=-1 :=FNjump ELSE
:=0
 2130 DEF FNbnf:IF fnd=FALSE :=FNjump EL
SE :=0
 2140 DEF FNbfo:IF fnd=TRUE :=FNjump ELS
E :=0
 2150 DEF PROCassemble:ptr=&70:st=store%
+15:FOR pass=0 TO 2 STEP 2
 2160 P%=code%:[OPT pass:.print LDA #st
MOD 256:STA ptr:LDA #st DIV 256
 2170 STA ptr+1:.pr2 LDY #0:.pl LDA (ptr
),Y:BEQ stop:JSR &FFE3:INY:BNE pl
 2180 INC ptr+1:JMP pr2:.stop RTS:]:NEXT
:ENDPROC
```

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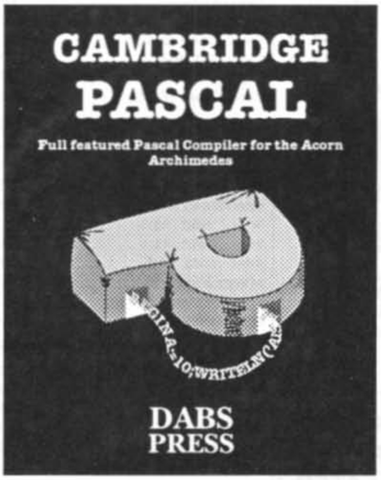

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A tale of two syncs

Mike Cook finds a use for PC systems in the BBC Micro environment

THERE are undoubtedly a lot of those pesky PCs and clones about. Of course popularity has never been equated with quality – look at how many Dickens stories there are compared with the number of hours of Crossroads – but, nevertheless, I am often asked if there is anything that can be done with a PC system.

Well, it is a far, far better thing that can be done with the monitor than can ever be done with the micro.

In other words, the monitor can be a useful addition to any BBC Micro set-up. Unfortunately the two systems are not directly compatible, mainly with regard to their sync pulses, so this month let's look at how they can be made to work together.

There are a plethora of different monitors and standards masquerading as the so-called PC standard, so first we'll see how they compare to the true micro standard.

First of all we have the MDA – Monochrome Display Adaptor – which was used only with the earliest of machines. This is the equivalent of a black and white monitor and takes the composite video produced at the back of a BBC Micro.

Perhaps the most common of the lower cost systems is the CGA or Colour Graphics Adaptor. This can be used in various modes similar to the original BBC B, but it can display 16 different colours as opposed to the Model B or Master's eight. Nevertheless the monitor used for this was still a TTL input.

TTL stands for Transistor Transistor Logic and it simply means a logic signal with zero volts representing off and anything over 3.5 volts representing on. The extra colours are achieved by using what is known as an RGBI TTL input as opposed to a straightforward RGB TTL input. Put simply, each colour – red green or blue – can be on or off.

The I or intensity line determines how brightly a colour is to be displayed. As this signal is digital we can in effect have the eight Model B colours in either bright or dim versions. The EGA or Extended Graphics Adaptor, has an identical system of colours but better resolution, so the monitors normally have a finer dot. In addition, in order to get higher resolution the scan line frequency is changed from the normal 15.75 KHz to 21.85 KHz.

This allows more lines to be scanned in each frame and so cuts flicker. However, in order to cope with software that required CGA graphics, most EGA monitors can work at both scan rates.

Finally the VGA – Video Graphics Array – has a virtually unlimited number of colours, achieved by using analogue rather than digital inputs. In this way each colour can be gradually turned up to the exact amount needed.

Again the resolution has been increased, necessitating the scan line frequency being increased to 31.5 KHz. This is similar to the set-up used in some of the modes – like Mode 20 – available on the Archimedes.

Many, but not all, VGA monitors will also work with the two slower scan frequencies, in which case they are often called multisync or auto-scan.

Just to confuse things, there is also a Hercules high resolution monochrome standard, but we'll not be concerned with that here.

Some PC monitors have a frame rate of 60Hz instead of the usual 50Hz; this is not too much of a problem as the two rates are so close that they are normally within locking range. If they will not lock the picture will slowly roll: All is not lost, however, as

➤

Converting a BBC B

Unfortunately the vertical sync is not available in the correct polarity and so we have to employ a cunning little wheeze to invert it. First locate IC48 – the middle IC below the metal box of the UHF modulator. You will probably find that it is soldered in.

Take a small sharp pair of side cutters and snip off pin 10. Solder a short wire from the IC side of the leg to pin 14 of the same IC. Now locate S31 just below IC48 and remove the link. From the centre pin of the three solder a wire to pin 11 of IC41 which is about 7cms by 8cms from the top right hand corner.

Now to make the horizontal sync patch. Fortunately pin 6 of the RGB socket is easy to disconnect: The wire stands proud of the socket and it is easily snipped halfway up. Solder a wire from the socket side to pin 8 of IC33 – this can be found about 6cms in and 5cms down from the top left hand corner of the board

Converting a Master

Due to the way the printed circuit board is laid out this is a little tricky. To make the vertical sync patch, locate IC25 – 110cms in by 85cms down from the top right hand corner of the board – and with a small sharp pair of side cutters and snip off pin 9. Solder a short wire from the IC side of the leg to pin 4 of the same IC.

Now to make the horizontal sync patch. Unfortunately pin 6 of the RGB socket is not as easy to disconnect on the Master as the BBC Micro due to the design of the socket. You need to use a small grinding wheel of the type supplied with many miniature drills to break the connecting metal strip to the centre connection.

Solder a wire from the socket side to pin 8 of IC34 – this is located just to the left of IC25. Strictly speaking this is not the horizontal sync but a mixed sync signal.

But most separate sync monitors won't mind triggering their line sync off this because they are so much faster, and the design of the Master makes these syncs invert during frame flyback, so they are always available.

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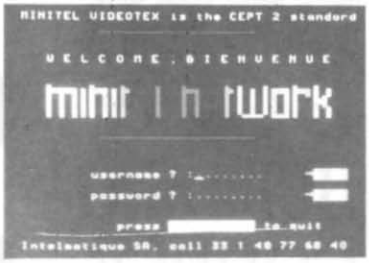
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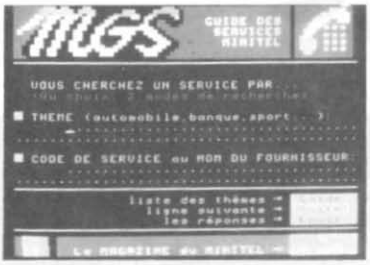
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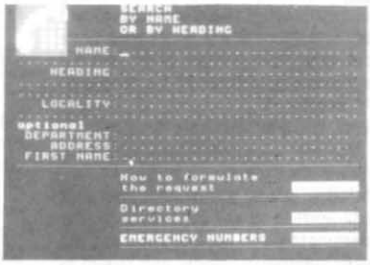
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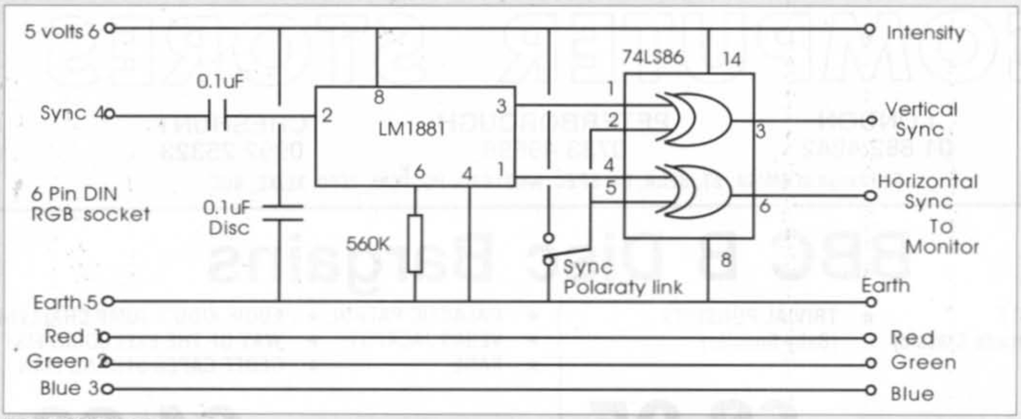

Figure I: Sync separator

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there is certain to be an adjustment potentiometer inside the monitor.

The picture height control, perhaps inside the monitor as well, might have to be adjusted if the system was originally used with a 60Hz rate. Remember to be careful when delving inside a monitor as high voltages are present even when it is disconnected – seek assistance if you are unsure.

Clearly then, if we want a PC monitor to use on our Model B or Master, it needs to be a CGA one. Alternatively we can use an EGA one if it will work with the lower sync rate. For an Archimedes we need a VGA monitor and it needs to be a multi-sync version if we want to use all the modes.

Well that sounds straightforward, but there are two snags. The first is what to do with the intensity input of the monitor. Very simply, you can either connect it to 5 volts if you want a bright display or zero volts for a dimmed one.

The second problem is more tricky. Most CGA and EGA monitors have two sync inputs which require feeding with separate horizontal and vertical synchronising pulses.

The problem is that the Model B and Master only produce one sync output consisting of the two signals mixed – known as a composite sync signal. Ironically they are generated separately inside the micro and mixed before they come out.

So we have to provide the monitor with separate sync pulses and we can do this in two ways. We can separate the two signals in a circuit between the monitor and micro or we can prevent them from being mixed together in the first place and feed the two signals out of our micro.

The first solution has the advantage of not requiring any modification to the micro, thereby leaving it usable on any monitor system. However it calls for extra circuitry and therefore costs money.

The second solution has the advantage of costing nothing, but requires internal modification to the micro. Let's look at both solutions so you can choose which you prefer.

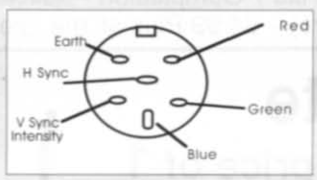

Figure II: Connecting a monitor to a modified computer

In order to separate the two sync signals we have to effectively filter the composite signal and then reconstruct the original logic levels.

Fortunately a single integrated circuit will perform these functions, the LM1881. We can mount it on a small board and power it from the 5 volts provided on the micro's RGB socket. The full circuit is shown in Figure I.

As the output drive from the LM1881 is a little limited it is passed through an Exclusive OR gate to beef it up. This also offers an opportunity to invert the sync pulses if necessary by an optional link. Most monitors require negative-going pulses but a few need them to be positive-going.

The board has a 6 way socket for the input: This is the same as the BBC Micro's RGB socket and should be wired up with a one to one cable. On the output side there is a 7 way socket and the cable should be wired up to suit the monitor being used. All parts for this circuit are available as Body Build pack No. 58 along, with a small printed circuit board.

However, spending money is not the only solution. If you don't mind putting your micro under the knife you can come up with a modification that costs you nothing.

The RGB socket is a 6 way one and we first need to make the mixed sync output – pin 4 – into a vertical or frame sync output. Then the 5 volts output – pin 6 – has to be made into a horizontal or line sync output.

The exact details will depend on which 8 bit micro you have and are given in the adjoining panels. However, only make these modifications if you have the confidence and skill to reverse them. If you are at all in any doubt use the extra circuitry.

Having modified your micro, you no longer have the 5 volt output available to connect to the monitor's intensity input. However, you should use the vertical sync output because this spends most of the time up at 5 volts. The only time it is at zero volts is during frame flyback when there is no video output anyway.

Figure II shows the connections to be made to the monitor at the back of a modified micro. Well, there you have it. At last a practical use for a PC system. See you next month.

WARNING

Remember to be careful when delving inside a monitor as high voltages are present – even when it is disconnected. Seek expert assistance if in doubt.

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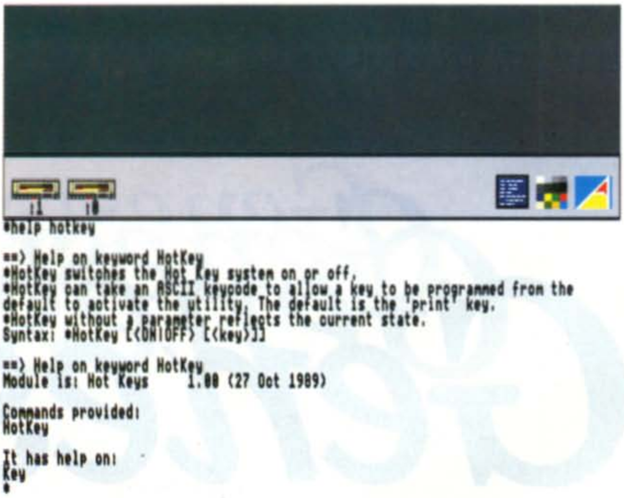
Only a key press away

Gareth Long tackles the problem of grabbing screens using Risc OS on the 32 bit Archimedes series and BBC A3000 with a very versatile relocatable module



```
*help hotkey

==> Help on keyword HotKey
*HotKey switches the Hot Key system on or off.
*HotKey can take an ASCII keycode to allow a key to be programmed from the
default to activate the utility. The default is the 'print' key.
*HotKey without a parameter reflects the current state.
Syntax: *HotKey [<ON|OFF> [<key>]]

==> Help on keyword HotKey
Module is: Hot Keys     1.00 (27 Oct 1989)

Commands provided:
HotKey

It has help on:
Key
*
```

Any screen can be saved with the user-transparent HotKey module

THE ScreenGrabber utility from the December 1988 issue of *The Micro User* provided a useful facility for taking a snapshot of the Archimedes screen under Arthur 1.20. However, after Risc OS was released, the original was rendered about as useful as a biodegradable plastic gnome. So here's the new updated module: HotKey.

Admittedly, ScreenGrabber's way of working was a bit naughty, so a different method was needed to provide the same effect. Unfortunately this resulted in a complete re-write of the code, so I took the opportunity to make a few additions making it easier to add your own code, or star commands to be acted upon when a hot key is pressed.

Type in the listing, using the checksums to make sure you've made no typing errors, save and run. The module will be assembled and saved to disc under the name HotKey in the Modules directory of your work disc. If you don't have a directory by that name you'll have to create one. At this point you can press f1 to load the module – in future you can double-click it from the DeskTop or use:

```
*RMLoad HotKey
```

Those who just want a snapshot of the screen need look no further. Just type:

```
*HotKey ON
```

Press Return and from here on pressing the Print key causes the module to save the current screen to the disc in drive as screen0000 and return you to the application you were using.

However, this new module is capable of more than just saving the screen with a keypress. You now have access to the command HotKey with which you may switch the utility on or off by specifying after the command. Optionally you may postfix this with an Ascii number for the key you wish to use as the *Hot Key*. The default entry is in decimal, though you may change the base by prefixing it with the base number:

```
*HotKey ON 160
*HotKey ON 2_11010110
*HotKey ON 16_D4
```

Next set up your star command using the system variable *KeyPress* using the *SET command. By default it is set to the command *GrabScreen*, but you can change it to any valid star command. For example:

```
*Set Alias$KeyPress Mount 0
*HotKey On 129
```

will *Mount the disc in drive 0 whenever function key 1 is pressed.

You can use the default command in your own applications independently of HotKey by typing *GrabScreen. This works by incrementing a system variable – *GrabScreen%Number* – each time it is used and taking this as a postfix for the file name, so that files are saved as Screen1, Screen2 and so on without the need for any complex poking.

In this way you can save screens up to Screen9999 – the maximum 10 characters allowed by ADFS – if you have enough space.

Programmers can use the module for other purposes by adding their own machine code into the program within the code subroutine. Examples of this may include a mini-printer dump program or a debugging utility.

The module reserves 256 bytes for such a purpose, and this is pointed to on entry to the code routine by R12. You should take care, however, only to use X-SWIs and not to call any code which would return the ARM to user mode – this subroutine is called in interrupt mode.

With a bit of imagination you can easily modify the code provided to do anything you want within reasonable bounds. Some of the most interesting utilities should now be only a keypress away.

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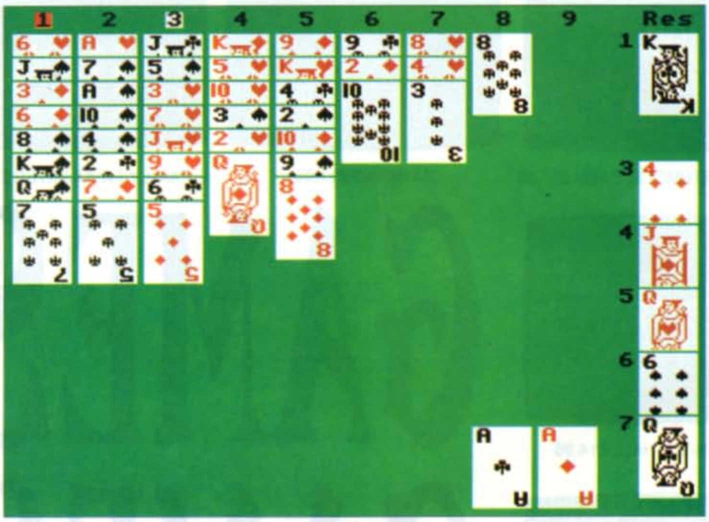
Now choose a card

Albert Gardner finds a new version of an old game that tries his patience to the limit



The start position

KING Albert Patience is quite the best single-pack version ever invented and is a genuine test of skill rather than luck. With practice you should be able to win about one game in two if you play well. Here's a micro-based version.

The program deals the cards for you face up in nine columns, with nine cards in the first column, eight in the second and so on down to one in the last column. The remaining seven cards form the *Belgian Reserve* and are placed separately to the right. To win you must extract the aces as they become available and build each one in suit up to its king.

You are only allowed to move one card at a time and the only ones available to be moved are at the bottom of any column, the top of any suit pile or any card in the Belgian Reserve.

You can move such a card either to its own suit pile if next in sequence, or to the bottom of a column if in downward sequence and opposite colour, or to any empty column regardless of its value. You can never move any card into the Belgian Reserve.

The program will make sure you obey the rules, but success is up to you. To win you must try to create empty columns – and don't be too keen to put kings in them.

Not only can you use them to take a card which is blocking another column, but also you can use them to shift sequences from one column to another.

For example, suppose one column has 8S at the bottom and another has the sequence 7H, 6C, 5D, 4C at the bottom. If there are two empty columns, say 6 and 8, you can move the entire sequence on to the 8S as follows: 4C to column 6, 5D to column 8, 4C to 5D leaving column 6 empty, 6C to column 6, 7H to 8S, 6C to 7H leaving column 6 empty, 4C to column 6, 5D to 6C, 4C to 5D.

Notice that the last two moves regain the two empty columns for further use.

At the start the program asks for a deal number. For a random deal enter 0, or to replay a previous one enter the appropriate number and, when asked, the number of redeals. The second program now loads and presents the requested deal. Any redeals are carried out automatically.

To move a card, simply state where *from* and where *to* by hitting the appropriate keys are shown in the table. If you try to make an illegal move the program will beep and pop up a window with a message telling you what's wrong.

To help you understand any message the *from* is always highlighted in red and the *to* in white.

Type in each listing – ensuring it is correct with the checksums – saving the first as King and the second as King2. Run King to play the game.

Helping hand..

When you quit, the program will display the deal number and number of redeals for you to note if you want to try the same deal again in a later session.

If you can manipulate every column so that no card is covered by a higher card, ignoring any in the Belgian Reserve, the program will complete the patience for you.

A nice easy deal to get you started is number 187489, redeals 0 and a slightly harder one is 1567, redeals 0. But for a real challenge, try 2285, redeals 0. It *can* be done, but can *you* manage it?

Moving cards around

From	
The bottom of a column	1 to 9
The Belgian Reserve	R followed by 1 to 7
A suit-pile	P followed by S,H,C or D
To	
The bottom of a column	1 to 9
Its suit-pile	P
Other options	
S	Restart the same deal
D	Redeal a different deal
Q	Quit

MAIN VARIABLES

col%(a,0)	The number of cards in column *a*.
col%(a,b)	The *b*'th card in column *a*.
from%	The *from* column
to%	The *to* column
L%	Number of redeals
M%	Deal number
Pk%	The shuffled pack
P%(s)	The number of cards in suit-pile *s*
P%	The total number of cards put to suit-piles
S%	Suit of card
V%	Value of card
W%	Won game indicator
X%,Y%	Screen position of top-left corner of card
Z%	Screen position of bottom-left corner of card

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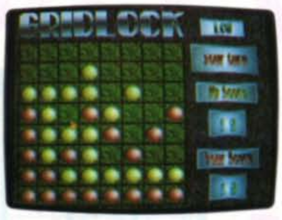

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Listing I

```
   10 REM King Albert Patience Loader
   20 REM by Albert Gardner
   30 REM (c) The Micro User
   40 MODE7
   50 PROCprt("KING ALBERT PATIENCE",5,1
,1):PROCprt("by",8,3,0)
   60 PROCprt("Albert Gardner",10,6,1)
   70 PROCvdu:PROCassemble
   80 PRINTTAB(11,14);CHR$133;"Deal Numb
er ";:INPUT""M%
   90 IFM%=0 L%=0 ELSE PRINTTAB(15,16);C
HR$133;"Redeals ";:INPUT""L%
  100 IF PAGE>&1100 THEN PAGE=&1100
  110 CHAIN"KING2"
  120 DEFPROCvdu
  130 VDU23,224,15,7,6,6,130,206,241,200
  140 VDU23,225,248,240,16,177,19,83,35,
223
  150 VDU23,226,196,227,208,200,200,200,
200,0
  160 VDU23,227,11,243,3,7,11,19,19,0
  170 VDU23,228,31,15,4,5,8,6,68,99
  180 VDU23,229,248,241,115,83,89,93,161
,25
  190 VDU23,230,95,114,137,144,160,192,1
60,0
  200 VDU23,231,15,117,147,9,5,5,5,0
  210 VDU23,232,255,255,255,255,255,255,
255,255
  220 VDU23,233,206,219,219,219,219,219,
206,0
  230 VDU23,234,80,216,248,112,32,0,0,0
  240 VDU23,235,32,112,248,112,32,0,0,0
  250 VDU23,236,32,112,248,248,32,0,0,0
  260 VDU23,237,112,168,248,168,32,0,0,0
  270 VDU23,238,32,112,248,216,80,0,0,0
  280 VDU23,239,32,112,248,112,32,0,0,0
  290 VDU23,240,32,248,248,112,32,0,0,0
  300 VDU23,241,32,168,248,168,112,0,0,0
  310 VDU23,242,34,119,127,127,62,28,8,0
  320 VDU23,243,8,28,62,127,62,28,8,0
  330 VDU23,244,8,28,62,127,127,42,8,0
  340 VDU23,245,28,28,107,127,107,8,8,0
  350 VDU23,246,1,1,3,3,7,15,31,63
  360 VDU23,247,128,128,192,192,224,240,
248,252
  370 VDU23,248,127,127,127,127,61,1,1,3
  380 VDU23,249,254,254,254,254,188,128,
128,192
  390 VDU23,252,7,4,6,12,21,18,21,56
  400 VDU23,253,252,120,176,50,37,82,138
,15
  410 VDU23,254,68,139,136,144,144,144,1
44,0
  420 VDU23,255,19,229,5,9,9,9,9,0
  430 ENDPROC
  440 DEFPROCprt(A$,L%,C%,D%)
  450 IF D% A$=CHR$141+A$
  460 X%=(40-(LENA$))DIV 2 -1
  470 FORY%=L%TOL%+D%:PRINTTAB(X%,Y%);CH
R$(128+C%);A$:NEXT
  480 ENDPROC
  490 DEFPROCassemble
  500 FORI%=0TO2 STEP2:P%=&900:[OPT I%
  510 STA&70:STX&80:STY&81:LDA#10:LDX#&7
0:LDY#0:JSR&FFF1:LDA#23
  520 JSR&FFEE:LDA#250:JSR&FFEE:LDX#8
  530 .lpx LDY#8:LDA#0
  540 .lpy LSR&70,X:ROLA:DEY:BNElpy
  550 JSR&FFEE:DEX:BNElpx
  560 LDA#250:JSR&FFEE:LDX&80:LDY&81:RTS
  570 : NEXT
  580 ENDPROC
```

Get it right

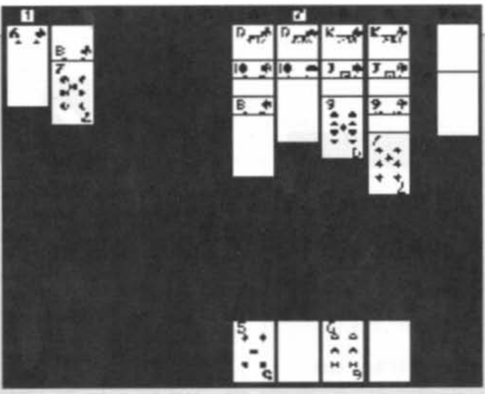
```
 10 =    0 0     300 = 3F76 3
 20 =    0 0     310 = A6C7 F
 30 =    0 0     320 = 1EA6 7
 40 = 8AFC C     330 = DC4D 0
 50 = 1535 F     340 =  AF6 9
 60 = 1F8E 7     350 = D0F7 2
 70 = 98C4 9     360 = 2A67 1
 80 = 84AB 1     370 = 4104 9
 90 = A496 1     380 = E0EC 1
100 = 2399 3     390 = 2A5A 3
110 = DC62 F     400 = 8D84 7
120 = E7C9 4     410 = 3071 D
130 = D945 F     420 = F76C 8
140 = CEAD D     430 = ED0F 2
150 =  2B2 6     440 =  686 E
160 = 45D7 8     450 = 246E 5
170 = 5705 4     460 = A5ED E
180 = 52B6 2     470 = 2EBA 1
190 = F85B 9     480 = ED0F E
200 =  305 2     490 = 98E9 D
210 = 7E5D 8     500 = F20E 5
220 = BE3C F     510 = 9C0B 3
230 = 4AA5 5     520 = F925 8
240 = CDF5 8     530 = EF9F E
250 = 1B79 9     540 = 4DA6 8
260 = DE7D B     550 = A1D4 A
270 = 9DB4 9     560 = 2AD5 9
280 = C6E6 F     570 = DA42 0
290 = 320D 1     580 = ED0F 7
```

Listing II

```
   10 REM King Albert Patience
   20 REM by Albert Gardner
   30 REM (c) The Micro User
   40 ONERROR GOTO 2260
   50 *TV0,1
   60 MODE1:PROCinit
   70 IF M%=0 M%=TIME
   80 A%=RND(-M%)
   90 FORA%=0TOL%:PROCshuffle:NEXT
  100 REPEAT
  110 PROCdeal:W%=0:P%=0:Q%=0:err%=0:fro
m%=1:to%=1
  120 REPEAT:VDU29,0;0;:F%=from%:PROCget
(I$(1)+I$(2)+I$(3)):F$=A$:from%=N%
  130 IFerr%ORF%<10PROCnum(F%,2)ELSEPROC
blank(F%)
  140 IFerr%ORto%<10PROCnum(to%,2)ELSEPR
OCblank(to%)
  150 err%=0
  160 IF from%=14 THEN 290 ELSE IF from%
>11 THEN T$="":W%=TRUE:GOTO 250
  170 IF from%<10 THEN 190 ELSE PROCget(
I$(from%-10))
  180 IF from%=11 from%=N%+9 ELSES%=N%-1
:from%=17
  190 PROCnum(from%,1):PROCget(I$(1)+I$(
2)):T$=A$:to%=N%
  200 IFto%=10 to%=17
  210 PROCnum(to%,3)
  220 IFF$=T$ VDU7:GOTO250
  230 IFF$="P" PROCfrom_pile ELSEIF T$="
P"PROCto_pile ELSEPROCmove_cards
  240 IFFNwon PROCauto
  250 UNTIL W%=TRUE
  260 IFF$="D"THEN L%=L%+1:PROCshuffle:G
OTO110 ELSE IFF$="S"THEN 110
  270 IFT$="P" PROCwon ELSE W%=FALSE
  280 UNTIL W%=FALSE
  290 MODE 7
  300 PRINTTAB(8,10)"Deal Number was ";M
%;TAB(10,12)"Redeals ";L%
  310 PRINTTAB(10,12)"Redeals ";L%
  320 *FX200
  330 END
  340 DEFPROCinit
  350 VDU19,2,2,0,0,0:turn=&900
  360 DIMcol%(16,20),P%(3),Pk%(51),I$(3)
  370 *FX200,1
  380 FORI%=0TO51:Pk%(I%)=I%:NEXT
  390 v$="A23456789"+CHR$(233)+"JQK"
  400 I$(0)="HDSC":I$(1)="1234567"
  410 I$(2)="89P":I$(3)="RSDQ"
  420 from%=1:VDU 23;8202;0;0;0;
  430 ENDPROC
  440 DEFPROCshuffle
  450 FORI%=0TO51
  460 J%=RND(52)-1
  470 K%=Pk%(I%):Pk%(I%)=Pk%(J%):Pk%(J%)
=K%:NEXT
  480 ENDPROC
  490 DEFPROCget(S$)
  500 REPEAT:A$=GET$:N%=INSTR(S$,A$)
  510 IFN% UNTILTRUE ELSE PROCmessage("O
ne of:",S$):UNTILFALSE
  520 IFQ%=0GOTO540 ELSE GCOL0,130:CLG:F
ORQ%=7TO9:IFcol%(Q%,0)>11 PROCcard(Q%,1)
  530 NEXT:Q%=0:VDU26
  540 ENDPROC
  550 DEFPROCmessage(A$,B$)
  560 IFQ%=2 ENDPROC
  570 Q%=1:VDU7,24,800;184;1052;280;18,0
,131,18,0,0
  580 CLG:MOVE800,280:PRINT;A$:MOVE800,2
48:PRINT;B$
  590 ENDPROC
  600 DEFPROCfrom_pile
  610 IF P%(S%)=0 GOTO750
  620 IF col%(to%,0)=0 GOTO650
  630 IF FNbot(to%)DIV 4 <>P%(S%)GOTO730
  640 IF(FNbot(to%)MOD 4)DIV 2=S%DIV 2 G
OTO740
  650 P%(S%)=P%(S%)-1
  660 D%=4*P%(S%)+S%-4
  670 PROCcard(7+2*S%+5*(S%>1),2-(D%<0))
  680 col%(to%,0)=col%(to%,0)+1
  690 col%(to%,col%(to%,0))=D%+4
  700 PROCcard(to%,1):PROCsuit
  710 ENDPROC
  720 :
  730 err%=-1:PROCmessage("Not in","Sequ
ence"):ENDPROC
  740 err%=-1:PROCmessage("Wrong","colou
r"):ENDPROC
  750 err%=-1:PROCmessage("Empty","colum
n"):ENDPROC
  760 :
  770 DEF PROCto_pile
  780 IFcol%(from%,0)=0GOTO750
  790 D%=FNbot(from%)
  800 R%=D%MOD 4
  810 IF D%DIV 4 <>P%(R%) GOTO730
  820 PROCcard(from%,0)
  830 col%(from%,0)=col%(from%,0)-1
  840 IFcol%(from%,0)>0PROCcard(from%,1)
  850 IF from%<11 GOTO870
  860 IFcol%(from%-1,0)>0 PROCcard(from%
-1,1)
  870 S%=R%:P%(S%)=P%(S%)+1
  880 PROCcard(7+2*S%+5*(S%>1),2)
  890 P%=P%(0)+P%(1)+P%(2)+P%(3)
  900 IFP%=52 W%=TRUE
  910 ENDPROC
  920 DEF PROCmove_cards
  930 IFcol%(from%,0)=0 GOTO750
  940 D%=FNbot(from%)
  950 IFcol%(to%,0)=0 GOTO980
```

➤

```
➤
  960 IF FNbot(to%)DIV 4 <>1+D%DIV 4 GOT
0730
  970 IF((FNbot(to%)MOD 4)DIV 2=(D%MOD 4
)DIV 2) GOTO740
  980 col%(to%,0)=col%(to%,0)+1
  990 col%(to%,col%(to%,0))=D%
 1000 PROCcard(from%,0)
 1010 col%(from%,0)=col%(from%,0)-1
 1020 IFcol%(from%,0)>0PROCcard(from%,1)
 1030 IFfrom%<11 GOTO1050
 1040 IFcol%(from%-1,0)>0 PROCcard(from%
-1,1)
 1050 PROCcard(to%,1):PROCsuit
 1060 ENDPROC
 1070 DEFPROCdeal
 1080 GCOL0,130:CLG
 1090 VDU5:GCOL0,0
 1100 FORI%=1TO16:PROCnum(I%,2):NEXT
 1110 MOVE1166,1008:PRINT;"Res";
 1120 FORI%=0TO3:P%(I%)=0:NEXT
 1130 K%=0
 1140 FORJ%=1TO9
 1150 FORto%=1TO10-J%:col%(to%,J%)=Pk%(K
%):col%(to%,0)=J%
 1160 PROCcard(to%,1):PROCsuit:K%=K%+1
 1170 NEXT:NEXT
 1180 FORto%=10TO16
 1190 col%(to%,1)=Pk%(K%):col%(to%,0)=1
 1200 PROCcard(to%,1):K%=K%+1
 1210 NEXT
 1220 ENDPROC
 1230 DEFPROCcard(O%,U%)
 1240 IFU%>1X%=120*O%-104:Y%=178:Z%=16:C
%=D%:GOTO1310
 1250 C%=FNbot(O%):S%=C%MOD 4:IFO%>9 Y%=
2246-128*O%:X%=1160 ELSE Y%=1014-48*col%
(O%,0):X%=120*O%-104
 1260 IFY%<160 Z%=0 ELSE Z%=Y%-160
```



Nearing completion

```
 1270 IFO%<6 OR O%>7 OR Y%>345 GOTO1290
 1280 IFP%(14-2*O%)>0 Z%=186
 1290 IF U%=1 OR from%<10 OR from%>15 GO
TO1310
 1300 IFcol%(from%+1,0)>0 Z%=Y%-126
 1310 VDU24,X%;Z%;X%+104;Y%+2;
 1320 GCOL0,130:CLG
 1330 IFU%=1 OR U%=2 PROCshow
 1340 VDU26
 1350 ENDPROC
 1360 DEFPROCshow
 1370 VDU24,X%;Z%;X%+104;Y%;
 1380 GCOL0,131:CLG:GCOL0,-(S%<2)
 1390 VDU29,X%+6;Y%-36;:MOVE0,32
 1400 V%=ASCMID$(v$,1+C%DIV 4,1):VDUV%
 1410 MOVE66,-92:A%=V%:CALL turn:IFC%=2
PROCace ELSEIFC%<4 PROCmid ELSEIFC%<40 P
ROCspots ELSE PROCpic
 1420 ENDPROC
 1430 DEFPROCsuit
 1440 IFto%>9 ENDPROC
 1450 IFcol%(to%,0)<2 ENDPROC
 1460 V%=(col%(to%,col%(to%,0)-1))MOD 4:
VDU26,18,0,-(V%<2),25,4,X%+72;Y%+44;242+
V%
 1470 ENDPROC
```

```
 1480 DEFPROCpic
 1490 MOVE18,10:B%=4*V%-72:VDUB%,B%+1,8,
8,10,B%+2,B%+3
 1500 MOVE18,-42:A%=B%+3:CALLturn:A%=B%+
2:CALLturn:VDU8,8,10:A%=B%+1:CALLturn:A%
=B%:CALLturn
 1510 PROCmid
 1520 ENDPROC
 1530 DEFPROCmid
 1540 MOVE32,-32:VDU242+S%
 1550 ENDPROC
 1560 DEFPROCace
 1570 MOVE18,-16
 1580 VDU246,247,8,8,10,248,249
 1590 ENDPROC
 1600 DEFPROCspots
 1610 V%=C%DIV 4:IFV%<3PROCpips(2,1):PRO
                                        ➤
```

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```
  10 =    0 0 |  350 = 3F7F E |  690 =  AFB 2 | 1030 = 5032 9 | 1370 = 7288 4 | 1710 = C76D 6 | 2050 = D8D4 8
  20 =    0 0 |  360 = CE73 A |  700 = D385 C | 1040 =  2E4 D | 1380 =  7C8 5 | 1720 = E1A8 4 | 2060 = CBBF E
  30 =    0 0 |  370 = 2FD3 A |  710 = ED0F C | 1050 = D385 4 | 1390 = 4E26 3 | 1730 = AE13 6 | 2070 = 97B9 B
  40 = 8706 6 |  380 = 2C7D 1 |  720 = 9719 F | 1060 = ED0F E | 1400 = 5AC0 1 | 1740 = 233B 3 | 2080 = 4AC7 2
  50 = DDC0 4 |  390 = F3F5 3 |  730 = 3F64 F | 1070 = E7AB 0 | 1410 = A005 0 | 1750 = ED0F 7 | 2090 = 38D6 2
  60 = 304F 8 |  400 = 4D81 C |  740 = D72F B | 1080 = C3D2 1 | 1420 = ED0F 7 | 1760 = A8BA 6 | 2100 = E978 1
  70 =  B4B E |  410 = 5B13 F |  750 = 3A53 9 | 1090 = A7C9 C | 1430 = F4D2 0 | 1770 =  23C 3 | 2110 = 2C83 3
  80 = 1612 D |  420 = 9E50 9 |  760 = 9719 1 | 1100 = F5AE 9 | 1440 = 7D10 8 | 1780 = ED0F 0 | 2120 = C3E2 8
  90 = 2F41 D |  430 = ED0F 8 |  770 = 75E8 A | 1110 = 55B3 D | 1450 = 7370 4 | 1790 = 5B82 0 | 2130 = ED0F 8
 100 = BFBA 3 |  440 = 3A21 F |  780 = 9B93 4 | 1120 = B35F 8 | 1460 = C0BF 2 | 1800 = DF2C A | 2140 = 2E6B D
 110 = CF3A 4 |  450 = B254 4 |  790 = A1A6 2 | 1130 = 582F 2 | 1470 = ED0F 1 | 1810 = CB83 F | 2150 = 4A09 E
 120 =  D47 B |  460 = 9448 C |  800 = 3302 3 | 1140 = D0B4 6 | 1480 = 51C2 7 | 1820 = E542 C | 2160 = FDFB 5
 130 = F100 8 |  470 = 4BD0 0 |  810 = 243E A | 1150 = 9439 0 | 1490 = BA37 6 | 1830 = DFD8 B | 2170 = 1E54 2
 140 = 249F 8 |  480 = ED0F 1 |  820 = 298D A | 1160 = D7EB 7 | 1500 = 1866 4 | 1840 = 72C5 B | 2180 = F24C 5
 150 = C2AD B |  490 = C730 7 |  830 =  6BD 8 | 1170 = 24BD F | 1510 = 368F 4 | 1850 = B5E7 D | 2190 = D274 1
 160 = F349 E |  500 =  29E A |  840 = 24C9 5 | 1180 = B605 5 | 1520 = ED0F E | 1860 = 8F7D 0 | 2200 = 440D 3
 170 = F08D 4 |  510 = B477 F |  850 = 8F10 0 | 1190 = 24CC 6 | 1530 = 2017 E | 1870 = 3677 7 | 2210 = 2C83 3
 180 = C954 4 |  520 = C2D2 0 |  860 =  2E4 E | 1200 = F967 D | 1540 = 137D 6 | 1880 = FC15 E | 2220 = 2C83 3
 190 = AB81 5 |  530 = 3765 F |  870 = 69E7 0 | 1210 = 2C83 F | 1550 = ED0F F | 1890 = 59A1 B | 2230 = F599 3
 200 = 2782 B |  540 = ED0F A |  880 = 549C C | 1220 = ED0F 5 | 1560 = AA9C C | 1900 = 3AE7 9 | 2240 = 453B 5
 210 = B8C1 7 |  550 = 5FC9 A |  890 = D260 5 | 1230 = 3F74 F | 1570 = F2BD 4 | 1910 = F24E 3 | 2250 = 9719 5
 220 = F8B3 D |  560 = 4A33 8 |  900 = E8F5 D | 1240 = E415 3 | 1580 = 9C60 F | 1920 = BFBA C | 2260 = 1193 A
 230 = 3DED 8 |  570 = EE26 D |  910 = ED0F 3 | 1250 = 35DD 5 | 1590 = ED0F A | 1930 = 26DF 0 | 2270 = C9C4 E
 240 = FABB B |  580 = 3095 C |  920 = 45D1 F | 1260 = 7C60 C | 1600 = 3D8A 7 | 1940 = BA4C 4 | 2280 = 6849 0
 250 = DB50 A |  590 = ED0F 7 |  930 = DC43 0 | 1270 =  F44 7 | 1610 = D821 D | 1950 = C9D3 2 | 2290 = 9719 8
 260 = EFCF 3 |  600 = A652 8 |  940 = A1A6 9 | 1280 = EA04 1 | 1620 = 6B33 8 | 1960 = ED0F 9 | 2300 = 6619 3
 270 = CB3B 8 |  610 = B2BF 1 |  950 = B65E 7 | 1290 = F1A1 D | 1630 = ED0F 9 | 1970 = 58EF 9 | 2310 =  39B A
 280 = 682B 5 |  620 = B34E 8 |  960 = AA2D D | 1300 = 9AAB 7 | 1640 = EA48 1 | 1980 = 6CBC 1 | 2320 = 6619 E
 290 = 1092 F |  630 = E580 3 |  970 = 4D62 7 | 1310 = D917 E | 1650 = BE1A 4 | 1990 = 5168 7 | 2330 =  39B 2
 300 = DA19 C |  640 = F3CC 8 |  980 = 29DA 6 | 1320 = C3D2 1 | 1660 = 2128 A | 2000 = ED0F C | 2340 = 5ACB 8
 310 = D63C D |  650 = F978 E |  990 = AA27 C | 1330 = EE6C 4 | 1670 = 7D37 C | 2010 = D468 2 | 2350 = C212 F
 320 =  71C B |  660 = B36F 5 | 1000 = 298D B | 1340 = B962 6 | 1680 = 10C0 8 | 2020 = 53DB C | 2360 = FCAF F
 330 = FD2E 4 |  670 = F439 2 | 1010 =  6BD D | 1350 = ED0F F | 1690 = ED0F E | 2030 = 9CFD F | 2370 = B9C1 E
 340 = 344C B |  680 = 29DA B | 1020 = 24C9 0 | 1360 = 6F25 D | 1700 = 2263 9 | 2040 = CA2C 2 | 2380 = 17E8 4
```

MIDNIGHT GRAPHICS

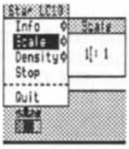
Multitasking Colour Sprite Dumps for the Archimedes

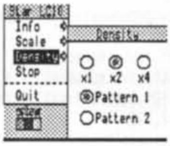
LC10 Colour Printer Sprite Dump

- Scaling available - any ratio is possible.
- Draft, double or quad density, for optimum speed or optimum quality
- Choice of special dithering patterns for best effect

The printer driver uses a dithering pattern to produce the required colour on the printout. The first pattern produces bright sharp colours, very similar to those on screen. The second pattern is used to reduce the 'moire' effect but results in more subdued colours.

A great deal of thought has been put into the patterns to produce the optimum results, bearing in mind the method the LC10 uses to perform it's colour printing. Experimentation with the two possibilities will result in improved performance.





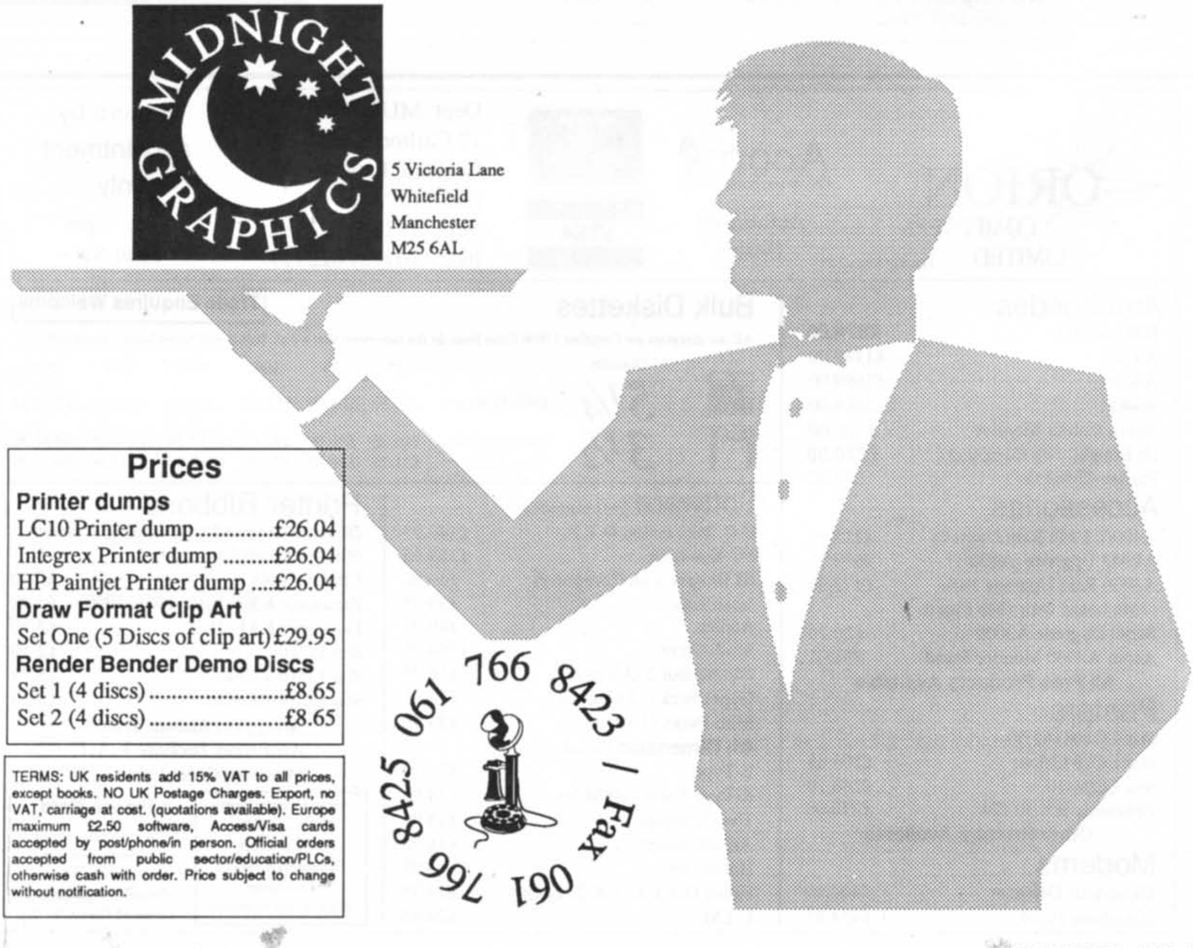
Integrex & HP Paintjet Colour Sprite Dumps

- Two dumps which have been developed to provide more accurate colour representation than using the standard Risc OS printer drivers. Both are multitasking and install on the icon bar in the same way as the LC10 dump.
- The HP Paintjet dump has an Overhead Projection mode which allows you to utilise this useful feature, enabling you to create slides and transparencies for use in presentations. (This mode enabling the printer to place more ink onto the print surface).

Render Bender Demonstration Discs

- Two sets of four discs, each disc containing one demonstration.
- The first set compiled by Clares Micro Supplies.
- The second set compiled by Dabhand Computing.

High Quality Draw Format Clip Art for the Archimedes



MIDNIGHT GRAPHICS

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Prices

Printer dumps

LC10 Printer dump	£26.04
Integrex Printer dump	£26.04
HP Paintjet Printer dump	£26.04
Draw Format Clip Art	
Set One (5 Discs of clip art)	£29.95
Render Bender Demo Discs	
Set 1 (4 discs)	£8.65
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```
➤
Cpips(74,1) ELSEPROCpips(2,2):PROCpips(7
4,2)
 1620 RESTORE (2290+10*V%):REPEAT:READA%
,B%:IFA%THEN PROCpips(A%,B%):UNTILFALSE
ELSE UNTILTRUE
 1630 ENDPROC
 1640 DEFPROCnum(I%,G%)
 1650 IFI%<10MOVE120*I%-62,1008:GOTO1680
 1660 MOVE1120,2246-128*I%
 1670 IFI%<17 I%=I%-9 ELSEI%=32
 1680 VDU18,0,G%,232,8,18,0,0,48+I%
 1690 ENDPROC
 1700 DEFPROCpips(A%,B%)
 1710 IFB%=1 MOVE38,-A% ELSE MOVE16,-A%
 1720 IFA%<40 E%=234 ELSE E%=238
 1730 VDUE%+S%
 1740 IFB%=2 MOVE64,-A%:VDUE%+S%
 1750 ENDPROC
 1760 DEFPROCblank(I%)
 1770 MOVE1120,2246-128*I%:VDU18,0,2,232
 1780 ENDPROC
 1790 DEF PROCwon
 1800 SOUND&11,-15,105,5:SOUND1,0,0,5
 1810 SOUND&203,-15,57,10
 1820 SOUND&201,-15,73,10
 1830 SOUND&202,-15,85,10
 1840 SOUND1,0,0,5
 1850 SOUND&201,-15,73,15
 1860 SOUND&202,-15,85,15
 1870 SOUND&203,-15,105,15
 1880 PROCprint("Congratulations!",32,86
0,0,1)
 1890 PROCprint("Y O U ' V E   D O N E
 I T !",32,790,3,0)
 1900 PROCprint("Would you like another
game ? ",32,720,3,1)
 1910 *FX 15,1
 1920 REPEAT
 1930 F$=GET$
 1940 UNTIL F$="Y" OR F$="N"
 1950 IF F$="N" W%=FALSE ELSE L%=L%+1:PR
OCshuffle
 1960 ENDPROC
 1970 DEF PROCprint(a$,X%,Y%,B%,F%)
 1980 GCOL 0,B%:MOVE X%,Y%:PRINT a$
 1990 GCOL 0,F%:MOVE X%+4,Y%+4:PRINT a$
 2000 ENDPROC
 2010 DEFPROCauto
 2020 IFfrom%<10PROCnum(from%,2)ELSEPROC
blank(from%)
 2030 IFto%<10PROCnum(to%,2)ELSEPROCblan
k(to%)
 2040 T$="P":IFW% ENDPROC
 2050 IFP%<49 Q%=TIME:SOUND3,-15,52,14:
SOUND3,-15,101,7:REPEAT:UNTILTIME>Q%+105
 2060 *FX212,248
 2070 PROCmessage("  Auto"," Finish")
 2080 VDU26:Q%=2:*FX212,144
 2090 J%=P%:REPEAT
 2100 FORfrom%=1TO16:PROCto_pile:IFP%>J%
SOUND&11,-(7+2*P%/13),1+2*P%,50:J%=P%
 2110 NEXT
 2120 UNTIL W%
 2130 ENDPROC
 2140 DEFFNbot(Q%)
 2150 =col%(Q%,col%(Q%,0))
 2160 DEFFNwon
 2170 FORI%=1TO9
 2180 IFcol%(I%,0)<2 GOTO2220
 2190 FORJ%=2TOcol%(I%,0)
 2200 IFcol%(I%,J%)DIV 4>col%(I%,J%-1)DI
V 4 J%=50:I%=50
 2210 NEXT
 2220 NEXT
 2230 IFI%>20 =FALSE
 2240 =TRUE
 2250 :
 2260 ONERROR OFF
 2270 MODE7:REPORT:PRINT" at line ";ERL
 2280 GOTO300
 2290 :
 2300 DATA0
 2310 DATA38,1,0
 2320 DATA0
 2330 DATA38,1,0
 2340 DATA38,2,0
 2350 DATA20,1,38,2,0
 2360 DATA20,1,38,2,56,1,0
 2370 DATA26,2,38,1,50,2,0
 2380 DATA14,1,26,2,50,2,62,1,0,0
```

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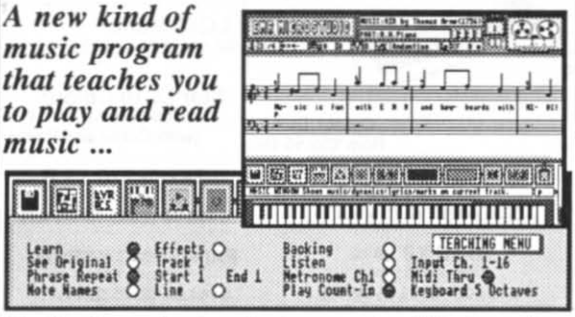

Learn ●
See Original ○
Phrase Repeat ●
Note Names ○
Effects ○
Track 1
Start 1 End 1
Line ○
Backing ○
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'Pineapple has produced one of the 'Ultimate' computer based video digitisers – Acorn User, April 1990
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PCB is a powerful Rom based printed circuit design program suitable for all BBC computers including the Archimedes. Its fast high density 1:1 or 2:1 scale print routine allows prototype boards to be made directly from a printout. The 2:1 print routine provides artwork quality suitable for the most discerning PCB manufacturer. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked-up' and moved around the board without having to respecify track requirements.

The full auto route facilities are available even on an un-expanded Model 'B' computer.

'PCB autoroute is remarkable. No similar software comes near the price'. – **Acorn User, August '88**
'Although it appears expensive, there is nothing else remotely similar even on other micros for less'.
– **Beebug, April '88**

PCB Manual track routing	£85.00	
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DIAGRAM II

Still the only BBC drawing package to allow really large diagrams (up to 30 mode 0 screens) to be created. The unique scrolling and indexing system allows easy access to any part of the diagram, and the rapid line drawing routines allow diagrams to be drawn really quickly. The print routines provide unequalled flexibility with infinitely variable H & V scales and 90 deg rotation if required. The smallest scale allows up to 18 mode 0creens to be printed on an A4 sheet with clearly readable text and full use can be made of wide carriage printers.

'The quality of printing is the last factor which makes Diagram II so outstanding. The package really is capable of producing top quality diagrams'. – **ETI, March '88.**

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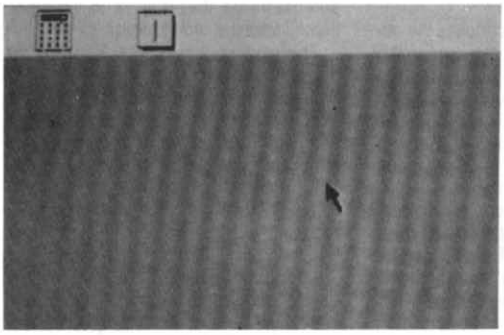
Harness your Wimp power

Not to be outdone by its 32 bit big brother, Glenn Marshall provides a desktop system for the 8 bit BBC Micro



ARCHIMEDES owners are often treated to an explanation of how to use the Wimp system on their machine. Now here's a short series on producing a Wimp-style system for the 8 bit BBC Micro.

Although most of the graphic routines are written in assembly language, you don't need to know how they work in order to use them. In fact the finished product – a desktop system – is just a collection of Basic programs.

The direct screen access method is used to achieve the speed required when updating the display. While Acorn frowns on this for 8 bit machines, it's the only realistic way of achieving our aims – the built-in graphics routines are just too slow.

Graphic effects are produced by storing values in the screen memory addresses. Try typing:

```
MODE 3:?&6400=255
```

Notice that a white block of pixels appears. This is because that particular position on the screen is controlled by the memory address &6400. If we write our data directly to the screen like this from machine code we can produce very fast graphics. We will be using Mode 3 for the desktop and also for all the examples. You may be thinking you've just read a typographical error as Mode 3 doesn't support graphics. However, remember that we are writing our own graphic commands, so we are not tied down to what the operating system decrees.

Monthly disc

All listings for this article are contained on this month's subscription disc. Alternatively they can be obtained by sending £2 and a formatted disc to Glenn Marshall, 147 Warwick Road, Scunthorpe, South Humberside DN16 1HH.

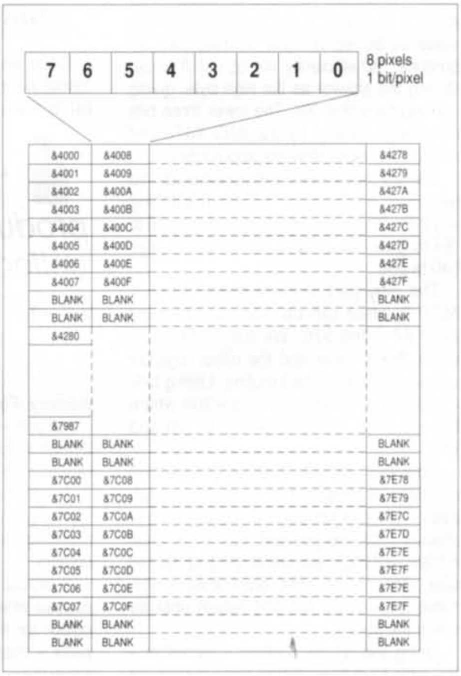
Mode 3 is useful for two reasons, the most important being that it allows 80 characters horizontally. This is needed if a menu is to support an option that is longer than a few characters and still look presentable. The second reason is that it uses 16k of screen memory as opposed to the 20k used by Mode 0 – the only other one that supports 80 character width.

In Mode 3 the screen memory starts at &4000 and ends at &7E7F. The screen is laid out as 80 bytes controlling the pixels horizontally and 200 bytes vertically. This gives the impression that the resolution is only 80 by 200 pixels. However, there are 640 pixels horizontally because each bit within a byte controls eight pixels.

Try this:

```
MODE 3:?&6400=195
```

Notice you get the pattern 11000011 – 0 is black and 1 is white. Now to make things awkward, the screen bytes are ordered in an illogical manner – or so it seems at first.



7 6 5 4 3 2 1 0
8 pixels
1 bit/pixel
&4000 &4008 &4278
&4001 &4009 &4279
&4002 &400A &427A
&4003 &400B &427B
&4004 &400C &427C
&4005 &400D &427D
&4006 &400E &427E
&4007 &400F &427F
BLANK BLANK BLANK
BLANK BLANK BLANK
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&7C06 &7C0E &7E7E
&7C07 &7C0F &7E7F
BLANK BLANK BLANK
BLANK BLANK BLANK

You would expect the bytes controlling the screen to be laid out relating to the actual screen bytes, going from 0-79 for the first row, 80-159 for the second row, and so on.

Figure I shows the layout for Mode 3 – note that the values shown are offset by &4000, so location zero is really &4000 and location five is &4005.

This means that if we are to use the screen in a similar manner to a piece of graph paper we must design a routine that ➤

➤

allows us to enter X and Y coordinates and then convert this to the appropriate screen memory address:

```
Address =
 &4000+(X*8)+(YDIV8)*640+(YMOD8)
```

This formula must now be converted into efficient machine code because it will be called by nearly all the other graphic routines. We cannot, therefore, use normal multiplication routines as they are far too slow.

We can use HIMEM to calculate the offset value, assuming that the application programs will be written in Basic. The high byte of this is stored in location &7 and the low byte is always zero. Notice that we use HIMEM instead of the value &40 to ensure that the routine will work in other screen modes without modification.

As the values for X and Y will be converted into numbers greater than 255 we use two byte variables. The _X*8_ can be achieved by shifting the input byte left three times, making sure we catch any bits being rotated out – lines 480 to 500 in Listing L-1-I on the subscription disc.

Now to convert the Y value. We can quickly produce _(YDIV8)*8_ by using _AND #&F8_ – line 530. If we then multiply this value by 80 we will get _(YDIV8)*640_. To produce _*80_ efficiently we can shift twice, storing the answer as the high byte, giving the original value _*64_. The lower three bits have been cleared by the _AND #&F8_ and so we don't need to worry about them.

We now have _*64_ in the accumulator, so two shifts will give us _*16_, again catching any bits shifted out. We then add the _*16_ to _*64_ to give _*80_. This is carried out in lines 540 to 560.

The only part of the formula left is _Y MOD 8_, which can be produced by using _AND #7_ – line 570. We then add the Y value, the X value and the offset together and we have a finished routine. Listing L-1-I contains a full version of _position_ where the resulting address is held in _ylb_ and _yhb_.

Now that we can access the screen memory as though it is a piece of graph paper, we can produce a routine to plot shapes using the position routine. To draw a filled rectangle we would start at the left side, draw to the right, drop down a line, move back to the left and repeat until we reach the bottom.

Using this as our method – algorithm – the code from lines 290 to 450 will produce a filled rectangle starting at pixel position _x1,y1_ and to the size of _x2_ pixels horizontally, and _y2_ pixels vertically.

Try running Listing L-1-I – lines 80 to 100 take the annoying separating lines out of Mode 3 – and note the time it takes to fill a screen should be 1.13 seconds. Although much faster than Basic, it is still not all that fast – you can follow it with your eye.

The problem lies with the code not being efficient enough. Examining it, we can see that inside the loop are some actions which we should minimise – loops are always the first part of a program you should look at if it is not performing as well as you require. The main point is that we call _position_ for every pixel we plot.

We already know that each byte on a row is eight away from the next, so we can simply add eight to the _ylb/yhb_ variables directly. This means we only call _position_ when the Y value changes. There's an improved version in Listing L-1-II. It shows a four fold speed increase and also demonstrates that it pays to consider exactly what the code is doing.

The routine works fine for drawing blocks of one colour, but we cannot use it to draw detailed shapes like a calculator icon. To do this we must change the routine slightly. First we need to design a sprite using a similar technique to the VDU23 command in Basic. We draw a matrix of boxes and fill them in where we require pixels to be set. Figure II shows how the calculator icon design looks.

As each pixel relates to a bit in a byte, we just convert each block of eight pixels into a byte number. For example, the first byte will be all the bits except for the top one set, so the value will be:

```
1+2+4+8+16+32+64 = 127 = &7F
```

Once we have the sprites' data in this format we can read a byte at a time from a list in memory and store them in screen memory. For this we need a 16 bit pointer – _coll/colh_ – to access each byte of colour, though in two colour modes it's just a pattern of blacks and whites.

> ❝ The finished product is just a collection of Basic programs ❞

To get the colour we use _LDA (coll),Y_ then store it to the screen as before, incrementing the pointer ready for the next colour.

It would be desirable to be able to choose whether to use a pointer or a fixed colour for the fill, so we add a flag called _pass_ – lines 460 to 550 in Listing L-1-III show the code.

For clarity in an 80 column mode, it's usually better if you draw sprites in black on a white background, which makes them stand out more, so VDU19 is used to reset the colours. We could just invert the sprite data – 0 becomes 1 and vice versa.

One of the main features of Wimps is the ability to draw a menu, icon, window or pointer on to the screen and when it is finished with, pull it off, leaving the previous display undisturbed.

To do this we'll save the screen in a section of memory as we draw the sprite and – when we've finished with it – restore the original, giving the impression that the sprite has disappeared. We can add this to our sprite routine with another 16 bit pointer.

At the point where we read a colour and store it to the screen we add a few lines to save the old byte in a block of memory. Listing L-1-IV gives the full version.

The routine is now much more flexible, and the variable _pass_ causes a number of effects depending on its value:

Value	Effect
0	Draw a sprite and save the screen
1	Draw fixed colour and save the screen
2	Draw a sprite
3	Draw a fixed colour
>127	Restore a sprite

The sprite restore facility simply reads the stored data as though it was reading a colour and stores it to the screen.

Listing L-1-IV contains the new sprite listing and Listing L-1-V includes code to test it. The sprite restore facility reads the stored data as though it was reading a colour and stores it to the screen. The calculator icon is drawn over the text and when it is restored the screen returns to its original state. Note that _stl_ and _sth_ have to be pointed to the beginning of the saved data to do this correctly.

Now try Listing L-1-VI which draws two calculators correctly. However, neither of the sprites are restored successfully. The problem is that the micro has no way of knowing where the sprites data is in memory or where the data needs to be written back to.

The answer is to add the sprite parameters and the address where the data is stored to the end of the saved data. Each sprite then has a tail of information so that a restore routine can read it and restore each sprite. We will need two new routines, one to handle drawing sprites and one to handle restoring them; both will access the original sprite routine.

Listing L-1-VII contains all four routines in their up-to-date versions. Notice most of the parameters are transparent, which means that the registers have the same values after the routine has been used as they did before. This is important, as one routine may call another that uses the same variables. If the second changes a value it may upset the caller.

These routines are not only the backbone of this article, but are the principle ones of many games. To keep you busy you could try moving a sprite around the screen. It is a simple matter of drawing a sprite and erasing it after a period long enough for it to fool our eyes into thinking that the sprite is moving.

● _Next month we will see how to produce an interrupt-driven pointer, consider other graphic routines and start work on producing the desktop._

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IN THE Spotlight

Pete Davidson interviews Steve Hanson of Superior Software

● When did Superior Software start, and what was its first product?

Superior Software started in autumn 1982. Its first four products were: Galaxy Birds, Space Fighter, Centibug and Invaders. The first three were written by Richard Hanson, the founder of Superior Software.

● How did those games compare with Superior's later releases?

These games were produced only for the BBC Micro and only in cassette form. Although relatively simple, they are still fun to play.

● A few years ago it was common to hear tales of programmers getting rich very quickly. Photographs of them standing next to their newly-acquired sports cars were a common sight in the press. Is it still a rewarding occupation?

Only a very few highly talented programmers are getting a good income out of producing computer games. Nowadays they are much more complex than those released a few years ago and take much, much longer to write.

Games produced by teams of two or more programmers are now quite common. For example, Ricochet had two game authors, two graphics designers and a loading screen designer.

● There must be a lot of people who've written a game and don't know what to do with it. How should they go about submitting it to a company like Superior, and how much could they expect to earn if it was accepted?

Although getting rich fast is not so easy for programmers nowadays, nevertheless a good game by a new author can, if it is carefully marketed, earn the author a few thousand pounds.

We are always looking for new games for the BBC/Electron and Archimedes micros, and several by previously unknown authors are at present under development.

They may be released as individual titles, as occurred with Ricochet and Perplexity, or be included in compilations, as with Qwak (on Play It Again Sam 10) and Baron (on Play It Again Sam 11).

We are interested in receiving games for evaluation for the BBC Micro, the Electron and the Archimedes. They can be submitted on either disc or cassette.

It is very important that sufficient documentation is provided so that the game can be played in full. If a cheat version is available, this should also be submitted, as it can save a lot of time in checking the higher levels.

● Some people feel that they can make all the money for themselves if they think of a good name for a software house and publish their own games. What are the pitfalls they could meet by adopting this approach?

Unfortunately it's not quite so easy. The game code is only the first step. You then need to check compatability with all the different types of BBC Micros and various add-ons, and apply some protection to prevent piracy.

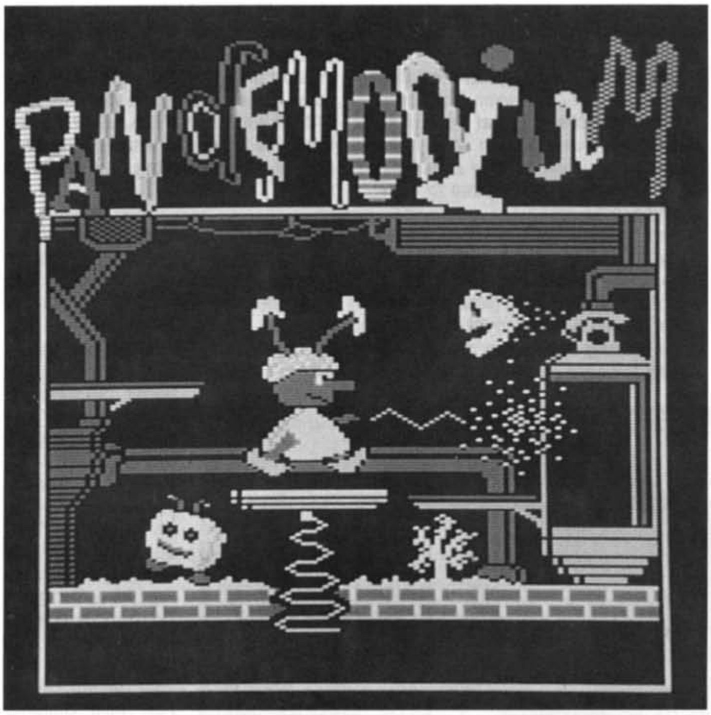
You then need the cassettes and discs, the printed labels, the printed inlays and instructions and the cassette/disc cases.

For most of these items bulk purchase is much cheaper than buying just a few items – so you need capital. Having sorted out the duplication, you will have your product. You've then got to sell it.

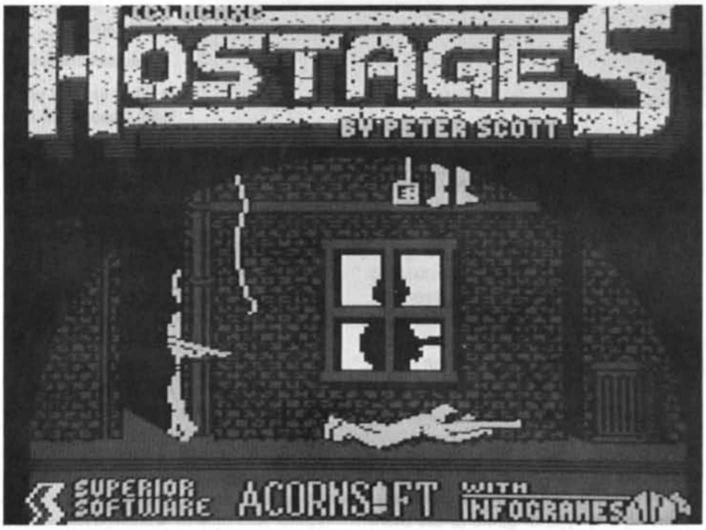
● Games are released in many forms – full price, budget, compilation, in a big box with a detailed manual or in a plastic case with brief instructions.

How do you decide what sort of packaging to use and how to price the product?

We try to keep to a standard size packaging for cassettes and discs, as this is preferred by retail outlets such as W.H.



Pandemonium



Hostages – soon to be released

Smiths. It also makes for attractive collections of games in people's homes.

We also try to stick to standard prices. Our prices of £9.95 for cassette, £11.95 for 5.25in disc and £14.95 for Master Compact discs have remained the same for several years, which in practice means that our prices have been reduced.

However, unreasonably high prices tend to promote piracy, as has happened to a large extent with the Atari ST and Amiga markets, and may happen with the Archimedes market if software houses are not careful.

The exceptions to our standard packaging and prices are our mega-games such as Elite, Revs + Revs 4 Tracks, Exile and Repton Infinity.

Each of these include a large booklet (for Exile there are two booklets, a novella and an instruction manual), which requires the larger video type case. The higher prices relate to the extra costs of the booklets and the higher development and royalty costs.

● At present you sell games for all Acorn micros from the Electron to the Archimedes series. What is the present split between the various micros and how do you see this changing in the future?

The market split has not changed appreciably over the past two or three years, with the BBC Micro sales being highest, followed by Electron sales, with Archimedes being a long way behind.

We are very committed to the BBC Micro and Electron market and will continue to produce new and original games for these computers for several years to come.

There are so many hundreds of thousands of BBC Micro and Electron micro in schools and homes, with a very strong second-hand market, that we expect the BBC Micro and Electron markets to remain buoyant for several years to come.

We will also be publishing a few very high quality games for the Archimedes, such as Hostages and Superior Golf, but we don't intend to jump on an Archimedes bandwagon to the detriment of BBC Micro/Electron computer owners.

● What do you consider the most important elements for a good game on the BBC Micro?

A good game on the BBC Micro requires the same attributes as a good game on any computer, that is playability, good use of graphics and sound and originality.

The BBC Micro owner is probably more keen on strategy type games than other computer users, which helps to explain the massive success of the Repton games and arcade adventures like Citadel and Ricochet.

● What is the most popular game that Superior has ever released?

The most popular individual title was, surprisingly, Overdrive – now on our Superior Collection compilations.

The most popular series of games was, and continues to be, Repton games, which have now sold well over 100,000 units on the BBC Micro and Electron.

One of the biggest groups of Repton addicts are housewives. Once their hus-

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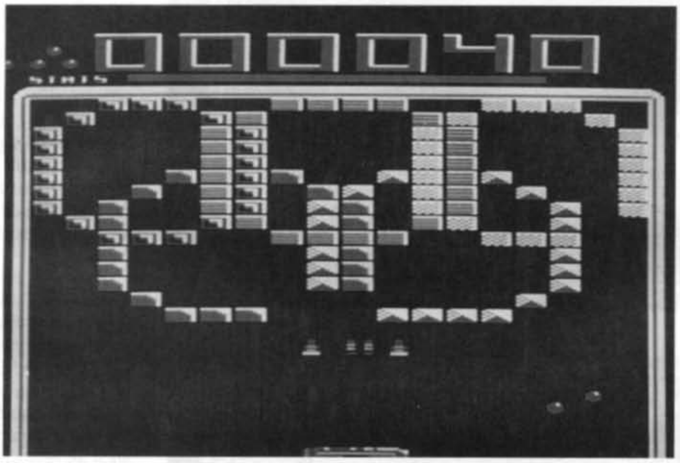
➤

bands and children are safely out of the way, on goes The Life of Repton and another couple of screens are sorted out. The highest selling games at present are the Play It Again Sam compilations, now up to number 12.

All these compilations, from number 1 through to number 12 are almost equally popular. It's not surprising since the collection includes, at affordable prices, nearly all the best games ever produced for the BBC Micro and Electron, such as Thrust, Stryker's Run, Galaforce, Killer Gorilla, Frak!, Imogen, The Sentinel, Firetrack, Snapper, Winter Olympiad 88, Zalaga, Skirmish and The Last Ninja.

If readers have ideas for future inclusions, please let us know.



Hyperball – super fast action

● What is your own favourite game on the BBC Micro, and why?

You might expect me to choose one of the mega-games such as Elite or Exile, but I don't get too much time for game-playing so I prefer the sort where you can get enjoyment from a short playing time, but which exercise the mind.

At present I find both Ricochet and Perplexity provide very enjoyable relaxation. Occasionally I'll have another stab at trying to complete Repton 2.

● Why did Superior decide to specialise on the Acorn games market and remain there rather than expand in to other types of software and other micros?

Superior has been publishing games for the BBC Micro from the start and has built up a reputation for good quality and original games.

This was recognised by Acorn Computers who, in 1986, agreed to Superior taking over Acornsoft releases. Other software houses who published over the full range of computers tended to neglect the BBC Micro market or produced second-rate products, almost as an afterthought.

Superior has always placed the BBC Micro/Electron market first and hence has been successful in this niche.

● One of the latest trends in games software is to licence the name of a film or use a famous person to promote a product. This obviously costs a lot of money, so why is it done? Doesn't it lead to a more expensive product or one of lower quality?

Licensing is now very popular throughout the software leisure market. The advantage to the publisher is that much of the marketing has already been done, hence costs can be much reduced and quality does not need to be reduced to offset licensing costs.

Such products would not be successful if the consumer did not want them. Although we have licensed film rights, as with Predator, and BBC television game rights, as with A Question Of Sport, most of our licensing deals are for products previously released on other computer formats, such as Barbarian and The Last Ninja. Again, reduced marketing costs can offset the cost of the licence.

Our recent licensing agreement with Infogrames opens up a whole range of new games for Acorn computers, including some of the most original titles ever produced for micros, starting with Hostages and Sim City in the summer. Other possibilities for the future include Captain Blood, North & South and Drakkhen.

● Games can usually be categorised – adventure, shoot-'em-up or simulation for example. Would you consider releasing any type of game or are there some that you would avoid... and why?

We try to release a full range of games, although we find that arcade adventures and strategy games are particularly popular in the BBC Micro/Electron market. Very good shoot-'em-ups, such as Galaforce and Firetrack, also do well.

On each Play It Again Sam compilation we try to give a mix of the various types of game to keep everyone in the family happy.

● When you buy a record it's the artist and title that are important – many people couldn't even tell you who the publisher is. However with software it's the software house whose name is promoted rather than the author's. In fact, many games in the past were released without a mention of the author. Do you think this is fair and what is Superior's policy on promoting the author's name?

We always acknowledge the authors on our game inlays or instructions and we encourage authors to get in touch with magazines and discuss their games and give hints.

One problem with promoting the author's names is that many write one game, sometimes very succesfully, and that's it. With authors who consistently produce top quality games, such as the very talented Peter Scott, we freely and very happily acknowledge his authorship.

I think it is well known that he programmed such brilliant games as The Last Ninja, Superior Soccer and Barbarian II. He is now working on Hostages.

● What are the problems associated with converting games to the BBC Micro from 16 and 32 bit micros and do you have any plans for this type of conversion on the future?

The main problem associated with converting games to the BBC Micro and Electron from 16 and 32 bit micros is that players (and reviewers) will inevitably compare the result with the original games, and may then be disappointed.

However Ballistix was a very successful conversion of the Atari ST and Amiga release by Psygnosis, and our version of Sim City, to be released later this year, will be based more on the Amiga version of the game (which was selected as the Top Game of 1989 in America) than the Commodore 64 one.

● What does the future hold for Superior Software?

We will continue our present a mix of totally new releases, such as Ricochet and Perplexity), licensed games such as Predator and Last Ninja 2) and Play It Again Sam compilations.

Licensing deals with companies such as Infogrames should also bring to Acorn computers the very best of products from the American and European markets, such as Sim City.

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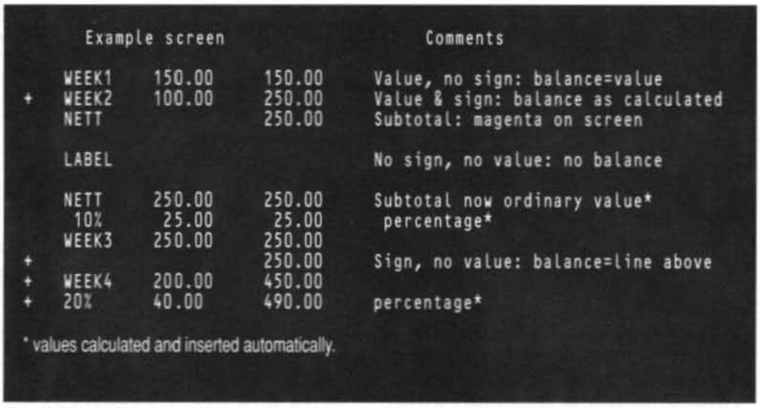
Clevercalc!

When simple calculators are not enough and spreadsheets are just too much, Mike Jackson's program fits the bill



```
      Example screen                        Comments

    WEEK1    150.00      150.00     Value, no sign: balance=value
 +  WEEK2    100.00      250.00     Value & sign: balance as calculated
    NETT                 250.00     Subtotal: magenta on screen

    LABEL                           No sign, no value: no balance

    NETT     250.00      250.00     Subtotal now ordinary value*
     10%      25.00       25.00      percentage*
    WEEK3    250.00      250.00
 +                       250.00     Sign, no value: balance=line above
 +  WEEK4    200.00      450.00
 +  20%      40.00       490.00     percentage*
```

* values calculated and inserted automatically.

A typical SuperCal screen

YOU know how it is. You're working on a set of figures, like your home accounts or your 1990 budget forecasts, but now you need to see what will happen if you change some of the figures – or perhaps you just got something wrong.

Using an ordinary calculator, you'll have to re-enter some, perhaps all, of your calculations. This is messy, time consuming and boring – and you may not get a printout. Of course, you could use a spreadsheet but they can be clumsy and hard work for smaller calculations.

SuperCal not only stores all your entries, it carries out all calculations, lets you edit any entry and then automatically does recalculations. All you have to do is type in the figures you want to calculate, with the sign and an optional label.

But it doesn't stop there: You can use subtotals and percentages which will be updated for you at all times. You can print pages, plus save and load files. There's even a small caculator built in for sums within sums, which can also be printed. And nearly all at the press of a key.

Type in the listing and make sure you've made no errors using the checksums. Save and then run it.

You'll see a red line at the top and bottom of the screen. Below the top line is a green arrow, which marks the current line. At the top is the status panel which will be explained later. At the bottom is the main prompt which tells you to press an arrow key, Return or one of the red function keys.

The example shows a typical screen display. In the left column is the sign, next is the label, then the value. The fourth column shows the balance for each line which is calculated for you.

Three calculation pages can be selected with f1, f2 and f3 – the number of the current one is displayed next to the P in the status line. Each has 18 lines which you can select with the cursor keys; press Return to enter or edit a line.

The bottom panel now changes to reveal a prompt to type in the operator (*, /, + or -) for this value. Type it in and press Return. Now you'll get the prompt for the label, which can be any five characters. Last you get the prompt to type in the value. Type in a number – you can use a decimal point – and press Return.

For all these steps pressing Return leaves the current value unchanged. To delete use a single space for the first two and zero for the last. As soon as you've finished you'll see the results automatically calculated for you and printed in the right hand column.

You can leave out any of the sign, label or value. The notes in the example show you what happens if you leave out the sign or value. You can omit the label except when using subtotals and percentages.

And that's all there is to entering your own calculation. Try entering the first two lines of the example.

Subtotals

Look at *NETT* on lines three and seven of the example. You can block off part of your calculation and carry its subtotal forward. To do this, move to the line immediately below the block, press f0, type in the label and press Return. The label and the result are now printed in magenta. No value is given and the result is the same as the line above.

To use the subtotal later in the calculation, copy the original on to a fresh line. Using the example, move to line three and press f6. Move to line seven and press f6 again. The line will now be printed as an ordinary line in yellow. The label will be NETT and the value will be automatically written in for you. This will be the same as the original value and will change automatically whenever the subtotal changes. You can edit to add a sign, but not a value.

The only conditions are that the label must be identical and that it must come after the original subtotal. It will even work on a different page, so you can use a subtotal to carry balances forward. To see it in action, change the value on line two from 100 to 200.

Percentages

Look at lines 8 and 12 in the example. To get a percentage enter a line as usual, but for the label put the number and the % sign, with a maximum of five characters – don't put in a value. When the line is displayed, the value will be calculated and entered for you, using the value from the line above. This will be changed for you whenever the value above is changed.

A percent of a percent will not be updated. You cannot take a percentage of a subtotal direct but can convert the subtotal to a value first, as with *NETT*.

Other options

The calculator works by default to two decimal places – as for money. To remove this limit, press Shift+f3. A list of the red key options will be displayed if you press Shift+f0. Pressing Escape and calculation errors will always take you back to the main screen and prompt. Changing the decimal places mid-page may make the display untidy you can re-format by changing page or pressing Escape. Dividing by zero gives a result of zero.

Special functions

Insert line: Move the line marker to where you want to insert a blank line and press f4. The rest of the page from there is moved one line down. If the bottom line is occupied you'll hear a beep and you won't be able to insert.

Sometimes a line looks empty when it's not, so if you get beeped when it looks clear delete the bottom line with f5.

Delete line: Move to the line to be deleted and press f5. The rest of the page below it will be moved up one line.

Line copy: Move to the one to be copied and press f6. On the status panel, the CP marker will change to *Y* to show the line is stored. You can carry out any other tasks, including change of page.

When ready, move to the line you want to copy to, and press f6 again. The label and value will be copied and CP will change back to *N*. To add a sign, edit the line as normal, press Return, type the sign, then press Return three times. If the line is occupied, it will be automatically inserted if there's room.

To copy twice, press f6 again to restore before changing lines. To move a line, press f6 to copy it, then f5 to delete it and finally put it in the new position.

Printing: The whole display between the red lines will be printed if you press f7.

Filing: To load a file press f9, type in the file name as prompted and press Return. To save a file press f8 and follow same procedure. All three pages are saved and loaded together including signs, subtotals and percentages.

Quick calculator

You may need to do a series of small calculations where you only need the total in the main calculator. Press Shift+f1. You will be asked if you want to print the results. Press Y for yes, or N for no.

You will now see a blue box. Type in the sign followed immediately by the number then Return. The result will be displayed next to the = sign on the line below. Repeat this until you have calculated all the numbers you want. Then press E or e and Return.

You can include percentages by simply typing % immediately after the number and before Return. Here percent works as on an ordinary calculator, so *10% will give you the bare percent. The printout will look like this:

```
+100   =100
*10%   =10
```

You can also use brackets like this:

```
+10*(20-5) =150
```

Once finished, the result of the Quick Calculator is stored. You can transfer it to the main calculator using Shift+f2. The result will become the value on that line.

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If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

```
   10 REM SuperCal
   20 REM by Mike Jackson
   30 REM (c) The Micro User
   40 DIM I$(75),V(75),S$(75),A(75),T(75
),TL(3)
   50 ON ERROR PROCagh
   60 *FX4,1
   70 VDU23,1,0;0;0;0;:*FX225,240
   80 CLS:PRINTTAB(0,2)CHR$145;STRING$(3
9,CHR$172);TAB(0,21)CHR$145;STRING$(39,C
HR$172)
   90 CP$="N":P=0:D$="`":*FX6,0
  100 G=0:N=1:L=3:LL=3:@%=&20209:PROCt:P
ROCkey
  110 END
  120 DEF PROCkey
  130 PRINTTAB(0,L-P)CHR$130;"] "
  140 PRINTTAB(0,23)CHR$130;"^keys(])";C
HR$132;"OR";CHR$130;"Return (Edit)";CHR$
132;"OR";CHR$130;"fKey";CHR$132;CHR$136;
"?";CHR$137
  150 K=GET
  160 IF(K>135ANDK<140)PROCnl ELSE IF K=
13 PROCadd ELSE PROCred
  170 ENDPROC
  180 DEF PROCnl
  190 IFK=136 L=P+3 ELSE IFK=137 L=P+20
  200 IF(K=139 AND L-P>3)L=L-1
  210 IF(K=138 AND L-P<20)L=L+1
  220 PRINTTAB(1,LL-P)"  ";TAB(0,L-P)CHR
$130;"] ":LL=L:PROCkey
  230 ENDPROC
  240 DEF PROCadd
  250 PRINTTAB(0,23)CHR$130;TAB(17,23)CH
R$136;CHR$132;"]";CHR$137;CHR$157;CHR$13
1
  260 PRINTTAB(1,23)" +/-* or space:R";T
AB(23,23)STRING$(16," "):INPUTLINETAB(23
,23)S$
  270 IFS$=""ELSEIF(S$="+"ORS$="-"ORS$="
*"ORS$="/")S$(L)=S$ ELSES$(L)=""
  280 PRINTTAB(1,23)"Label or space:R";T
AB(23,23)STRING$(16," "):INPUTLINETAB(23
,23)I$
  290 IFI$>"" I$(L)=LEFT$(I$,5)
  300 PRINTTAB(1,23)"    Value or 0:R";T
AB(23,23)STRING$(16," "):INPUTTAB(23,23)
V$
  310 IFLEFT$(V$,1)="-"V$=RIGHT$(V$,LENV
$-1)
  320 IFV$>"" V(L)=VALV$
  330 PRINTTAB(1,23)CHR$156;TAB(3,23)STR
ING$(36," ")
  340 IF TL(N)<L TL(N)=L
  350 IF T(L)=1 T(L)=0
  360 R$=RIGHT$(I$(L),1):IF R$="%" PROCp
nt
  370 PROCline
  380 R$=RIGHT$(I$(L+1),1):IF R$="%" L=L
+1:PROCpnt:PROCline:L=L-1
  390 PROCans
  400 ENDPROC
  410 DEF PROCline
  420 PRINTTAB(0,L-P)STRING$(40," ")
  430 IF T(L)=1 PRINTTAB(4,L-P)CHR$133;T
AB(7,L-P)I$(L):ENDPROC
  440 PRINTTAB(4,L-P)CHR$131;S$(L);TAB(7
,L-P)I$(L)
  450 IF V(L)>0 PRINTTAB(13,L-P)V(L)
  460 ENDPROC
  470 DEF PROCans
  480 FOR X=L TO TL(N)
  490 IF T(X)=0 A(X)=FNA ELSE A(X)=A(X-1
):PROClk
  500 PRINTTAB(23,X-P)STRING$(17," ")
  510 IFT(X)=0 C=134 ELSE C=133
  520 PRINTTAB(24,X-P)CHR$C
  530 IFA(X)<>0PRINTTAB(25,X-P)A(X)
  540 NEXT:PROCkey
  550 ENDPROC
  560 DEF FNA
  570 IF S$(X)=""THEN =V(X) ELSEIFS$(X)=
"/"ANDV(X)=0 =0 ELSE N$=STR$(A(X-1))+S$(
X)+STR$(V(X)):=EVAL N$
  580 DEF PROCred
  590 IF K=128 PROChlp
  600 IF K=240 PROCtotal
  610 IF K=247 PROCprntr
  620 IF K=244 PROCins
  630 IF K=245 PROCdel
  640 IF K=248 PROCdout
  650 IF K=249 PROCdin
  660 IF K=129 PROCqc
  670 IF K=130 V(L)=A:PROCline:PROCans
  680 IF(K=131AND D$="`")D$="U":@%=&0000
:PROCt ELSEIFK=131 D$="`":@%=&20209:PROC
t
  690 IF(K>240 AND K<244)PROCnp
  700 IF K=246 PROCcopy
  710 PROCkey
  720 ENDPROC
  730 DEF PROCtotal
  740 L$="Subtotal Label:R":PROCip:IF IN
$=""VDU7:PROCkey
  750 I$(L)=IN$:IF L>TL(N) TL(N)=L
  760 T(L)=1
  770 PROCline:PROCans
  780 ENDPROC
  790 DEF PROCip
  800 PRINTTAB(0,23)CHR$130;L$;TAB(17,23
)CHR$136;CHR$132;"]";CHR$137;CHR$157;CHR
$131;STRING$(16," ")
  810 INPUTTAB(23,23)IN$
  820 PRINTTAB(1,23)CHR$156:PRINTTAB(3,2
3)STRING$(36," ")
  830 ENDPROC
  840 DEFPROCins
  850 IF(TL(N)+1)-P>20 VDU7:ENDPROC
  860 TL(N)=TL(N)+1
  870 FORX=TL(N) TO L+1 STEP-1
  880 I$(X)=I$(X-1):S$(X)=S$(X-1)
  890 T(X)=T(X-1):V(X)=V(X-1)
  900 NEXT
  910 I$(L)="":V(L)=0:T(L)=0:S$(L)=""
  920 OL=L:FOR L=L TO TL(N):PROCline:NEX
T:L=OL
  930 IF G=1 G=0:ENDPROC
  940 PROCans
  950 ENDPROC
  960 DEFPROCdel
  970 FORX=L TO TL(N)-1
  980 S$(X)=S$(X+1):I$(X)=I$(X+1):V(X)=V
(X+1):T(X)=T(X+1)
  990 NEXT
 1000 S$(TL(N))="":I$(TL(N))="":T(TL(N))
=0:V(TL(N))=0
 1010 IF(TL(N)>4 AND TL(N)>=L)TL(N)=TL(N
)-1
 1020 OL=L:FOR L=L TO TL(N):PROCline:NEX
T:L=OL
 1030 PRINTTAB(0,(TL(N)+1)-P)STRING$(40,
" ")
 1040 PROCans
 1050 ENDPROC
 1060 DEFPROCcopy
 1070 IF CP$="N" M$=I$(L):VM=FNM:CP$="Y"
:PROCt:ENDPROC
```

➤

All program listings in this issue can be downloaded FREE on...
MicroLink

```
➤
 1080 IF(I$(L)>"" OR V(L)>0)THEN G=1:PRO
Cins
 1090 I$(L)=M$:V(L)=VM:M$="":VM=0
 1100 CP$="N":PROCt
 1110 PROCline
 1120 IF L>TL(N) TL(N)=L
 1130 PROCans
 1140 ENDPROC
 1150 DEF FNM
 1160 IF T(L)=1 =A(L) ELSE=V(L)
 1170 DEFPROCnp
 1180 IF(K=241 AND N>1)L=3:P=0:N=1 ELSE
IF K=241 PROCkey:ENDPROC
 1190 IF(K=242 AND N<>2)L=21:P=18:N=2 EL
SE IF K=242 PROCkey:ENDPROC
 1200 IF(K=243 AND N<>3)L=41:P=38:N=3 EL
SE IF K=243 PROCkey:ENDPROC
 1210 LL=L:CLS:PROCt
 1220 PRINTTAB(0,2)CHR$145;STRING$(39,CH
R$172);TAB(0,21)CHR$145;STRING$(39,CHR$1
72)
 1230 OL=L:FORL=L TO TL(N):PROCline:NEXT
:L=OL
 1240 PROCans
 1250 ENDPROC
 1260 DEFPROCt:@%=&0000
 1270 FOR X=0 TO 1
 1280 PRINTTAB(0,X)CHR$141;CHR$129;"Supe
rCal";TAB(18);CHR$132;"D:";D$;SPC3;CHR$1
33;"C:";CP$;SPC4;CHR$131;"P:";N
 1290 NEXT:IF D$="`" @%=&20209
 1300 ENDPROC
 1310 DEF PROCprntr
 1320 VDU2,21
 1330 FORX=P+3 TO TL(N)
 1340 IF(S$(X)=""ANDI$(X)=""ANDV(X)=0AND
A(X)=0)PRINT:GOTO1360
 1350 IF V(X)=0 PRINTTAB(5)S$(X);TAB(8)I
$(X);TAB(30)A(X)ELSE PRINTTAB(5)S$(X);TA
B(8)I$(X);TAB(15)V(X);TAB(30)A(X)
 1360 NEXT:VDU6,3:PROCkey
 1370 ENDPROC
 1380 DEF PROCdout
 1390 L$=STRING$(2," ")+"File to save:R"
:PROCip
 1400 Z=OPENOUT IN$
 1410 FORX=3 TO 75
 1420 PRINT#Z,S$(X),I$(X),V(X),T(X),A(X)
 1430 NEXT
 1440 PRINT#Z,TL(1),TL(2),TL(3)
 1450 CLOSE#Z:PROCkey
 1460 ENDPROC
 1470 DEF PROCdin
 1480 L$=STRING$(2," ")+"File to load:R"
:PROCip
 1490 Z=OPENIN IN$
 1500 IF Z=0 PROCkey:ENDPROC
 1510 FORX=3 TO 75
 1520 INPUT#Z,S$(X),I$(X),V(X),T(X),A(X)
 1530 NEXT
 1540 INPUT#Z,TL(1),TL(2),TL(3)
 1550 CLOSE#Z:K=241:N=2:PROCnp
 1560 ENDPROC
 1570 DEF PROClk
 1580 OL=L:FORL=X+1 TO 70:IF I$(L)=I$(X)
 V(L)=A(X):IF L-P<21 PROCline
 1590 R$=RIGHT$(I$(L+1),1):IF R$="%" L=L
+1:PROCpnt:IF L-P<21 PROCline
 1600 NEXT:L=OL
 1610 ENDPROC
 1620 DEF PROCqc:PRINTTAB(0,23)STRING$(3
9," ")
 1630 PRINTTAB(0,22)CHR$130;"Print MiniC
al?(Y/N)"
 1640 Q=GET:IF D$="`" @%=&20209
 1650 PRINTTAB(1,22)"+100% or E(e):R ";T
AB(17,22)CHR$136;CHR$132;"]";CHR$137;CHR
$157;CHR$131;TAB(21,23)CHR$130;"="
 1660 A$="0":REPEAT
 1670 INPUTTAB(23,22)V$:P$=V$:IF(V$="E"O
RV$="e")THEN1730
 1680 C$=LEFT$(V$,1):IFASC(C$)>48 VDU7:P
RINTTAB(23,22)STRING$(16," "):GOTO1670
 1690 IFINSTR(V$,"%")S$=LEFT$(V$,1):V$=R
IGHT$(V$,LENV$-1):V=VALV$*VALA$/100:V$=S
$+STR$(V):IF S$="*"A$=STR$(V):A=V:GOTO 1
710
 1700 A$=A$+V$:A=EVALA$:A$=STR$(A)
 1710 PRINTTAB(23,23)CHR$130;A;STRING$(1
0," ");TAB(23,22)STRING$(20," ")
 1720 IF(Q=89ORQ=121)VDU2,21:PRINTP$;TAB
(13)"=";A:VDU6,3
 1730 UNTIL(V$="E"ORV$="e"):PRINTTAB(1,2
2)CHR$156;STRING$(37," ");TAB(17,23)STRI
NG$(21," ")
 1740 IFLEFT$(A$,1)="-"A$=RIGHT$(A$,LENA
$-1):A=EVALA$
 1750 PROCkey:ENDPROC
 1760 DEF PROCagh
 1770 VDU7,6,3:K=241:N=4:PROCnp:ENDPROC
 1780 DEF PROCpnt
 1790 N$=LEFT$(I$(L),LEN I$(L)-1)
 1800 PS=VAL N$:V(L)=V(L-1)*PS/100
 1810 ENDPROC
 1820 DEF PROChlp
 1830 CLS:PRINTTAB(0,4):RESTORE1910
 1840 FORX=0 TO 12
 1850 READ A$
 1860 IFX<10 PRINTTAB(0,X+4)CHR$129;"
  f";X;TAB(9,X+4);CHR$131;A$
 1870 IFX>9 PRINTTAB(0,X+4)CHR$129;"SHIF
T f";X-9;TAB(9,X+4)CHR$131;A$
 1880 NEXT:PRINT
 1890 PRINTCHR$130;"New Page to return t
o SuperCal"
 1900 REPEAT:K=GET:UNTIL(K>240ANDK<244):
N=4:PROCnp:ENDPROC
 1910 DATA Subtotals,Page1,Page2,Page3,I
nsert,Delete,Copy,Print,Save,Load
 1920 DATA Quick Calculator, Transfer QC
 result,Decimal
```

Basic I

IF you have Basic I the checksum for line 1490 will be 8D5F 3 and the cumulative check digit will be wrong from this point onwards.

You can check your version of Basic by pressing Control+Break and then typing REPORT followed by Return. If the copyright date is 1981 you have Basic I.

Get it right ✓

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = B581 1
  50 = BE26 D
  60 = E383 C
  70 = FE9C E
  80 = 66EA 5
  90 =  DA7 3
 100 = F5B4 1
 110 = FD2E A
 120 = E09D 4
 130 =  7EB 0
 140 = EA58 3
 150 = 7BDA A
 160 = 35B8 C
 170 = ED0F 1
 180 = 29EB D
 190 = 53E7 4
 200 = AB7A D
 210 = B238 B
 220 = 262E 2
 230 = ED0F D
 240 = D7F1 1
 250 = 2247 4
 260 = 6C2E 7
 270 = 3BD1 7
 280 = 2F48 1
 290 = DE05 5
 300 = 1B0B E
 310 = 2095 2
 320 = FAF7 4
 330 = 5366 A
 340 = CCC2 E
 350 = 548E C
 360 = E5F9 7
 370 = 7CE9 D
 380 = 8A5E 0
 390 = B8AF D
 400 = ED0F 2
 410 = E285 C
 420 = 7F6B F
 430 = D92B 8
 440 = AD76 1
 450 = 1544 4
 460 = ED0F 9
 470 = 5AEC F
 480 = 39DE 4
 490 = 9B9D 5
 500 = 7370 7
 510 = F22F 5
 520 = F44F 5
 530 =  F16 1
 540 = 8DE5 0
 550 = ED0F 7
 560 = 9E1C C
 570 = F452 A
 580 = FEF3 3
 590 = FAFB 0
 600 =  ABF F
 610 = ED5B F
 620 = F979 2
 630 = C1AC 1
 640 = CF5E 8
 650 = AF60 5
 660 =    C 6
 670 = 63BF 3
 680 = 980E 4
 690 = 2CA0 4
 700 = 82A3 B
 710 =  2DE F
 720 = ED0F 3
 730 = 9CCE 1
 740 = DB2E 5
 750 = 67ED 5
 760 = 10EE 2
 770 = 13DF D
 780 = ED0F D
 790 = 63C1 C
 800 = A5EB 2
 810 = 7EFF 0
 820 = 7E36 7
 830 = ED0F 2
 840 =  796 9
 850 = B2C0 6
 860 = DCB3 1
 870 = A189 F
 880 = 86B3 2
 890 =   CA 4
 900 = 2C83 3
 910 = 570D 5
 920 = 829F 0
 930 = FCBC 3
 940 = B8AF 5
 950 = ED0F 5
 960 = 7AE3 D
 970 = 323E E
 980 = F500 E
 990 = 2C83 E
1000 = CD7A 6
1010 = E798 7
1020 = 829F 7
1030 = 656F 1
1040 = B8AF 6
1050 = ED0F E
1060 =  391 2
1070 = 326A C
1080 = 56F4 7
1090 = FB63 0
1100 = FB0A 4
1110 = 7CE9 F
1120 = 1CF2 B
1130 = B8AF 6
1140 = ED0F 7
1150 = 5F90 6
1160 = 7248 D
1170 = 4A05 F
1180 = FE97 F
1190 = 6559 6
1200 = BC39 C
1210 = 6A52 D
1220 = 6910 7
1230 = 150F E
1240 = B8AF 3
1250 = ED0F 2
1260 = 31E8 7
1270 = 4524 F
1280 = 96AF F
1290 =  736 5
1300 = ED0F A
1310 = BC32 C
1320 = 2956 C
1330 = 4B81 1
1340 = 7FB0 5
1350 = B06D C
1360 = F964 9
1370 = ED0F D
1380 =  87F D
1390 =   72 4
1400 = 638D 6
1410 = ED12 6
1420 = 530B A
1430 = 2C83 F
1440 = ED12 3
1450 = 6790 5
1460 = ED0F E
1470 = EB17 E
1480 = 420E F
1490 = 6B39 5
1500 =   A6 9
1510 = ED12 C
1520 = 831C 2
1530 = 2C83 5
1540 = 795F 3
1550 = FB21 5
1560 = ED0F 6
1570 = 3F6E B
1580 = FDA6 E
1590 = 8B85 D
1600 = BDDB 5
1610 = ED0F B
1620 = 2E10 E
1630 = 3329 6
1640 = FC6B 0
1650 = FCBE D
1660 = A260 A
1670 = 8122 7
1680 = DE49 D
1690 = 47F7 2
1700 = F857 3
1710 = 2A8C 3
1720 = 146B B
1730 = AE9B 5
1740 =  6BB D
1750 = 4B80 1
1760 = 432E F
1770 = 6BA9 9
1780 = 5E58 6
1790 = AB06 4
1800 = 9D03 0
1810 = ED0F 6
1820 = 927C D
1830 = 3DB2 A
1840 = F9B3 8
1850 = D84C 9
1860 = D859 9
1870 = C9D5 0
1880 = F700 E
1890 = C816 6
1900 = 9430 3
1910 = 6508 3
1920 = B099 5
```

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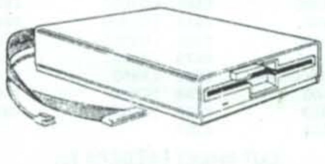
BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£439** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

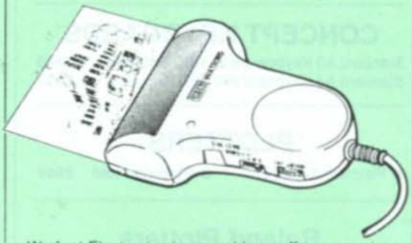
FREE with every BBC Master purchased from us during April

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module			£115
Econet Module for the Master			£47
Twin ROM Cartridge for Master			£9
Quad ROM Cartridge for Master			£14
Master Reference Manual I		(No VAT)	£14
Master Reference Manual II		(No VAT)	£14
Master Advance Ref Manual		(No VAT)	£17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
ECONET Upgrade Kit for BBC B			£42
ALL ECONET UPGRADES Available			
ARIES' IEEE Interface for BBC B & Master			£238
Morley Teletext Adaptor with ATS Rom			£99
Filestore E01S	£899	Filestore E40s	£749
Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

Price £149 (P&P £4)

Special Discount Scheme

For Teachers, Lecturers & Education.
Please phone for further details.

Z88 Portable Micro

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

32K RAM Pack or 32K EPROM Pack			£18.00
128K RAM Pack or 128K EPROM Pack			£45
512K RAM Pack			£175
Z88 Eprom Eraser Unit			£35
Z88 Spellmaster for Pipedream			£51
Z88 Carrying Case			£9
Z88 Computing Book			£9.95
AA Nicad Rechargeable Battery			£1.50
Battery Charger Compact & Fast			£6
Z88 Serial Printer Cable			£9
Z88 Parallel Printer Cable			£25
● Z88 to BBC Link	£20	● Z BASE	£56
● Z88 to PC Link II	£30	● Z TAPE	£42
● Z88 to Macintosh	£52	● Z TERM	£42
● Z88 Mains Adaptor	£9	● Z88 Modem	£149

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

Extended Finance Available

We are able to offer low cost finance to all our customers, including 0% finance on certain items. For further details please refer to page 9, column 3 of our advert.

ULTIMUM – Archimedes A3000 Podule Racking System

When Acorn originally designed the Archimedes micro, they released to all interested parties the specification of the expansion podule. This has now become the accepted standard for all manufacturers of Archi peripherals. The A300 & A400 both allowed expansion internally up to 2 or 4 podules. However, a newcomer to the affray has caused some upset. A3000 has only a single podule expansion slot, on the outside. There has been deliberation in the industry about a controversial "mini-podule" to be fitted to a special rack. This would entail a re-design of all the available podules onto a smaller board and understandably the manufacturers have rejected the idea completely. As always, Watford have come up with the only real solution to the A3000 expansion problem. The Ultimum Podule Racking System allows up to 3 full size standard A300/A400 series podules to be fitted to the computer. There is also provision for a hard disc drive and podule. Ultimum has its own PSU. There is also an IEC mains output socket for a monitor. It mounts on top at the rear of the computer, and allows direct access to the floppy drive and reset button, rather than obstructing access as on other non standard systems.

Watch this space for launch details.

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Archimedes Micros, Philips, Microvitec, and Multiscan COLOUR Monitors. Also on the full range of Panasonic Printers. Should your machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours to repair the unit.
(P.S. This offer is over and above our Unbeatable Winter Sale Offers on Archimedes Micros).
(Offer applicable only when bought at prices advertised in this advert).

Archi Graphic Tablet

This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

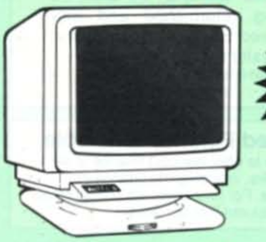
The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

(For further details, please telephone or write in for our FREE catalogue.)

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra **£29**

Continued→ → → → → → → → →

MONITORS



12 months FREE maintenance on site

MICROVITEC 14"

● **1431** – Standard resolution as used on the BBC television computer programme	£175
● **1451** – Medium resolution, suitable for word processing in mode 0	£219
● **1455** – MS Medium resolution, ideal for Archimedes	£220
● **1441** – High res, exceeds the capabilities of the BBC Micro	£359
● **1431AP** RGB + PAL and AUDIO	£199
● **1451AP** RGB + PAL and AUDIO	£255
● **2030 CS** 20" Med Res	£380
● **2040 CS** 20" Hi Res	£675
● Dust Cover for Microvitecs	£5.50
● **Touchtec 501 Touch Screen**	£239

14" MULTISCAN COLOUR

● **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen	£399
● **TAXAN** 770 LR Low Radiation, auto-scanning Ultra High Res	£429
● **TAXAN** Multiscan 870 16" Monitor	£575
● **TAXAN** Viking 19" Paper White, High Resolution (1152 x 896 with Archi 400 series)	£799
● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89	£389
● **EIZO** 9060SZ Low Radiation, Super High Resolution, Antistatic screen, multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA 0.28 Dot pitch	£469

TAXAN 12"

● Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch	£269

PHILIPS

● **BM7502** 12" Hi-res Green Monitor	£70
● **BM7522** 12" Hi-res Amber Monitor	£71
● **CM8833** 14" Med. Res Colour Monitor	£215

STAR BUY

● **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £189

Dust Cover for Philips Monitors	£6

(Securicor carriage on Monitors £7)

SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£12** (carr. £2.50)

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

Price £12

SPARE LEADS

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

CONCEPT KEYBOARDS

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117

PLOTTERS

● Plotmate A4S	£379	● Plotmate A3M	£549

Roland Plotters

(Official Roland Appointed Distributor)

● **DPX 2500**	**POA**	● **DXY 1100**	£595
● **DXY 1200**	£835	● **DXY 1300**	£1015

Panasonic KX-P1081

12 MONTHS FREE MAINTENANCE ON SITE

SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

● **KX-P1124** 24pin 80col. 192/63 CPS	£219
● **KX-P1540** 24pin 136col. 240/80 CPS	£425
● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£345
● **KX-P1624** 24pin 132col. 192/63 CPS	£349
● **KX-P1695** 9pin 132col. 330/861 CPS	£349
● **KX-P4420** NEW 8PPM Laser –Launch Offer	£999

● **Panasonic KX-P4450i** LASER PRINTER
Latest technology at Watford's special offer price £1,325

● Spare Toner	£29	● A4 Feeder	£55
● Drum Unit	£149	● Developer	£115
● 1MB RAM Upgrade			£299
● 2MB RAM Upgrade			£585

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1124 (P36)	£85	KX-P1180 (P37)	£79

BUFFERS

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592	£32	**P19** P1124/1180	£55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110	for KX-P1081, 1592 & 1595	£8
P115	for KX-P1180	£8
P145	for KX-P1124	£8
P140	for KX-P1540	£10

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red **£9.95 each**

INTEGREX COLOUR JET

● Colour Jet 132 Printer	£515
● Paper Roll	£6.50
● Screen Dump Software	£10
● Colour Cartridge	£19.50
● Black Cartridge	£11.25
● 100 A4 OHP transparencies	£55
● 8K Serial Interface Optional	£123

Citizen Printer Swift 24 £249

NEC P2 Plus Pinwriter £279

Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£59
Additional Font Cartridge	£25

NEC PINWRITER P6/P7 Plus

NEC P6+ 80 columns	£439	**NEC P7+** 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		
NEC Ribbons for		P6 £8;	P7 £9.50

Hewlett-Packard Printers

HP Quiet Jet Plus	£437
HP Desk Jet Plus	£549
HP Paint Jet Colour	£699
HP LaserJet Series IIP	£855
HP LaserJet Series II	£1265
HP Laserjet II TONER	£85
HP Scan Jet	£1499
1Meg Ram Add-on Laser Jet II	£349
1Meg Ram Add-on Laser Jet IIP	£275

12 months FREE maintenance on site

Star Printers

LC10 Printer	£136	XB24-10 Colourr	£399
LC10 Colour	£195	XB24 Colour Kit	£35
LC15	£275	LC10 Ribbon Colour	£5
LC24-10 Printer	£215	XB24-15 Colour	£515
LC24-15	£339	Cut Sheet Feeder	£55
NB24-10 Printer	£399		

EPSON PRINTERS

EX800	£429	LQ860 Colour	£510
EX1000	£564	LQ1050	£575
FX850	£315	LQ1060	£649
FX1050	£405	LQ2550+	£925
FX1060	£679	LX400	£132
GQ5000 Laser	£999	LX850	£195
LQ400	£198	SQ850	£490
LQ850	£459	SQ2550	£895
LQ550	£269		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90**.

ACCESSORIES

● EX800/1000 Colour Option	£55
● EX800/1000 Colour Ribbon	£14
● LQ2500 Colour Option	£65
● Multifont Card for LQ550/850/1050	£95

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 6'	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

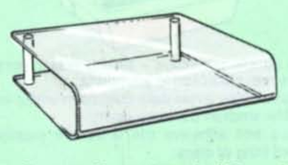
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

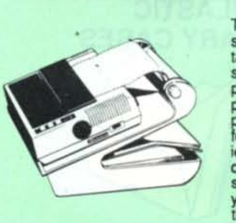
Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £28 (carr. £3)
132 Column version £30 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£3.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£3.95	£4.50
RX/FX80/MX80	£3.00	–
DMP2000	£3.75	£4.75
EX/LQ800	£4.50	£4.50
EX/LQ1000	£6.75	£5.00
RX/FX80/85/800/MX80	£3.25	–
RX/FX100/1000	£5.00	–
Kaga/Taxan KP810/815	£4.90	£5.00
LQ500/550/800/850	£4.50	£6.00
LQ1050/LQ2500	£7.00	–
LX80/86/800/850	£3.25	£4.50
M1009/GLP	£3.80	£3.75
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£3.50	£4.75
Panasonic KX-1124	£8.00	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£4.25	£5.00
Star LC24-10	£5.00	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

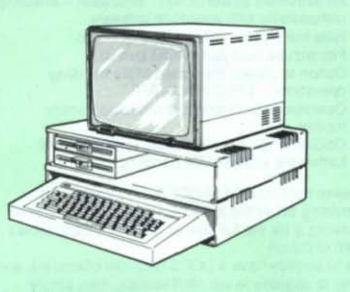
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



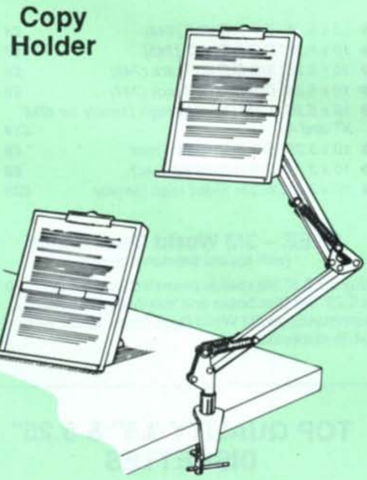
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Printer Plinth	420 x 310 x 105mm **£12**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

THE EPSON RX-FX-KAGA

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser

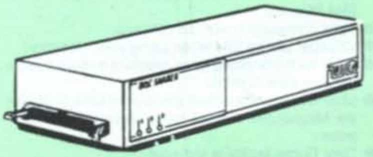
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £249

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

DISC DRIVE SHARER

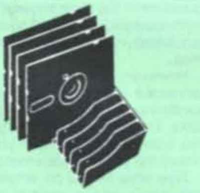


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price : **£65** Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	£16.00
● Watford DFS Kit complete	£69.00
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
● DFS Manual (comprehensive)	£6.95
● Acorn DNFS ROM	£17.00
● Acorn ADFS ROM only	£25.00
● Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

● SPECIAL PRICE	£44.00
● DDFS Manual	(No VAT) **£6.95**
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40T (744)*	*£5*
● *10 x 5.25" D/S D/D 40T (745)*	*£7*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£8*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£9*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£14*
● *10 x 3.25" S/S D/D 40/80 Track*	*£9*
● *10 x 3.25" D/S D/D 40/80 Track*	*£9*
● *10 x 3.5" Double Sided High Density*	*£22*

FREE – 3M World Desk Clock

(with special promoted boxes)

Buy 5 x 3.5" 3M special promoted Disc boxes, or 10 x 5.25" 3M Disc boxes and qualify for the specially commissioned 3M World Desk Clock. (Offer valid while stocks last).

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

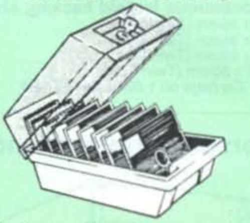
● *10 x **M3** 3.5" D/S D/D 80 Track*	*£9*
● *10 x **M9** 3.5" D/S High Density*	*£22*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£9*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£13*
● ***M2** 3" Double Sided*	*£3 each*

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS



Gives double protection – Strong plastic case that affords real protection to your discs.

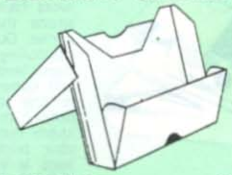
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.

Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	**£4.95**
● **M85** – holds up to 95 5.25" discs	**£6.95**
● **M25*** – holds up to 25 3.5" discs	**£4.95**
● **M50** – holds 50 3.5" discs	**£6.50**
● **M10** – holds 8 of No. 10 Data Cartridges	**£15**

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. Only £2.00

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

DISC ALBUMS

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

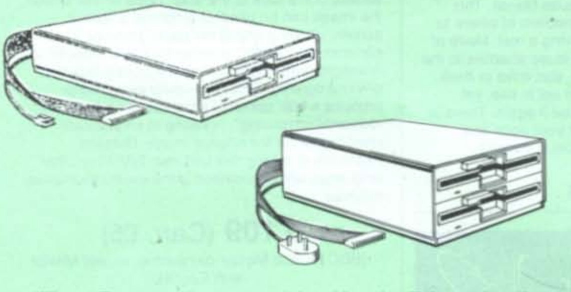
BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD400 £168	CS 400S £85	CD400 £188
800K (1,44M		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

Prefix *C = Cased Drive*
L = Less PSU
S = Single
D = Double

Suffix ***S*** *= 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer

- ● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- ● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- ● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

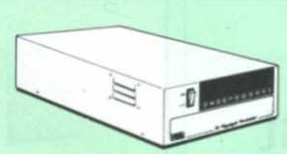
Drives to connect to BBC Micros own PSU

● CLS35 400K Unit £65 ● CLD35 Twin 800K £119

Drives with built-in Power Supply Unit

● CS35 Single 400K £85 ● CD35 Twin 800K £129

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

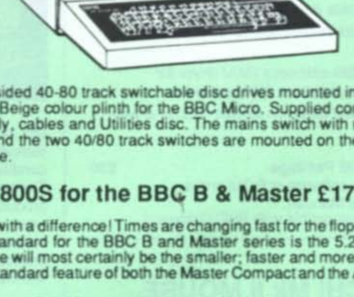
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£395** (carr £7)

CDPM 800S

DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

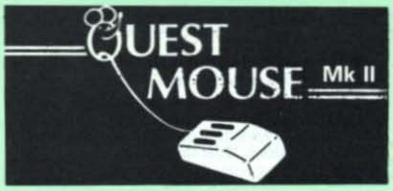
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



Quest Mouse II & Quest Paint	£58
Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
Quest Mouse II only	£29
Quest Paint Software only	£34
Quest Font Disc (22 Text Fonts)	£15
Quest Mouse Mat (Red or Blue or Green please specify)	£3
Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make.up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi
TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£52

THE NEW Mk III AMX MOUSE

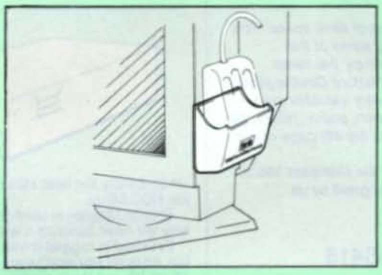
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

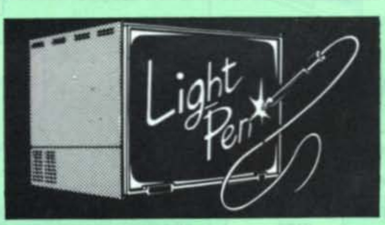
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB
VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

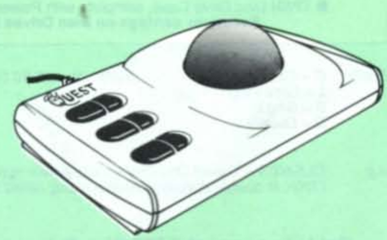
(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

NEW

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version	£32
QT-20 Archimedes Version	£35

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best DTP/ Word Processor

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

cont./-

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	**£69**
Wapping Editor plus Mouse	**£89**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

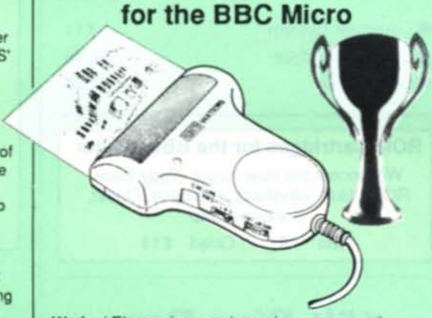
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

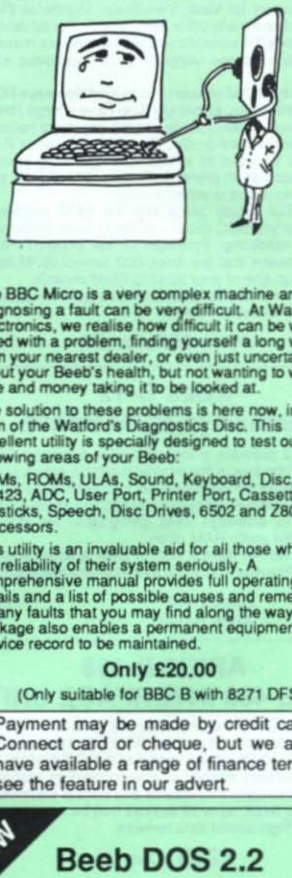
Beeb HandScan & Firmware	**£135**

Wapping Font Disc

Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms see the feature in our advert.

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

Continued→ → → → → → → → →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	£36
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

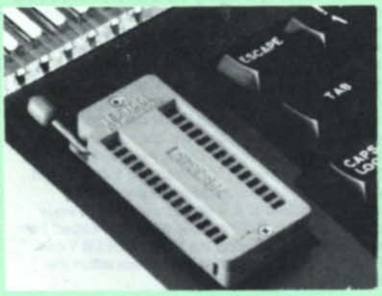
VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	£11
● Spare Cartridges	£2.75
● Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

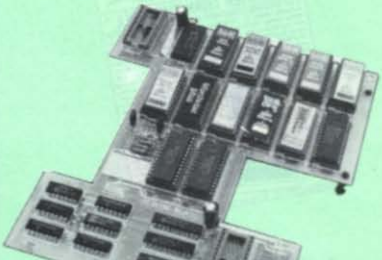
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted £3

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

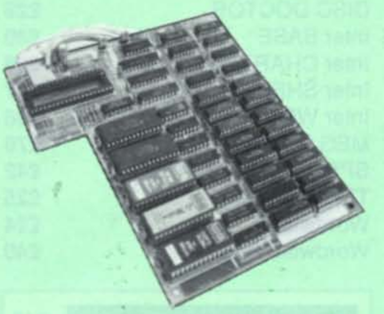
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

NTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches .... **£2 each**

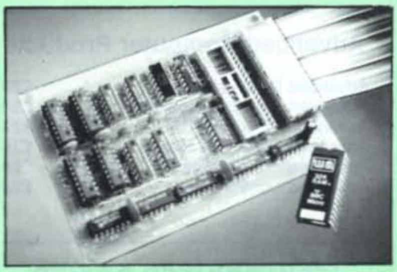
Complete ROM-RAM board
All options installed £115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer **£18**

Watford Electronics are:

- Acorn Qualified Dealer & Econet Referral Centre
- ARIES PC Dealer/Distributor
- Cambridge Computer Dealer
- Epson Silver Centre
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- Microvitec Appointed Dealer
- NEC Appointed Dealer
- Panasonic Premier Dealer
- Roland Plotter Official Dealer
- Star Printer Sub Distributor
- Taxan Monitor Distributor
- 3M Media Premier Distributor

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
BONDING: Science (Disc) O-Level Chemistry program.	£20.00
ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program.	£20.00
ELECTRONICS IN ACTION (Disc) O-Level program.	£19.95
NEWTON & THE SPACE SHUTTLE (Disc) O-Level program.	£20.00
ECOLOGY (Disc) O-Level program.	£20.00
POLYMERS (Disc) O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
FOOD & POPULATION (Disc) O-Level program.	£20.00
MICROTECHNOLOGY (Cassette) O-Level program.	£11.25
DEUTSCH DIREKT! (Disc & Audio Cassette)	£19.95
Modem Master (Disc)	£11.25
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Astronomy – Primary (Disc)	£12.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Black Queen Contract Bridge	£13.00
Espana Viva – 3 Discs	£19.95

Educational Software

FUN SCHOOL 2 – Red:

Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£13.00**

FUN SCHOOL 2 – Green:

6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£13.25**

FUN SCHOOL 2 – Blue:

Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£13.50**

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

Continued→ → → → → → → → →

VIEW 3.0 ROM	**£45**
VIEW PROFESSIONAL	**£50**
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£25
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW packs 1 & 2	£65
HI-VIEW	**£38**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

MINI OFFICE II

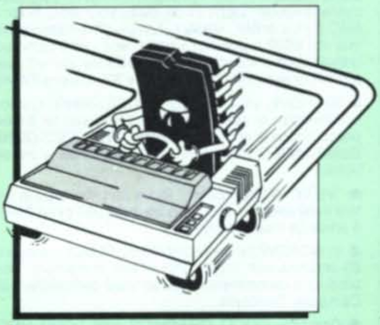
DISC Version for BBC B & B+	**£14.00**
DISC Version for BBC Master	**£16.00**
DISC Version for the Compact	**£18.00**

(When ordering please specify for which Micro & 40 or 80 track Disc)

Advanced Computer Products

Advanced Disc Toolkit	£28
Advanced Disc Investigator	£24
Advanced 1770 DFS BBC	£27
Advanced 1770 DFS Master	£28
Advanced File Manager	£24
Advanced Control Panel	£28

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find thomselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

COMPUTER CONCEPT'S ROMS

COMMUNICATOR	£49
DISC DOCTOR	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
MEGA-3 ROM	£76
SPELL MASTER	£42
TERMI	£25
Wordwise	£24
Wordwise Plus	£40

Wordwise plus **£40**

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

BOOK

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
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30 Hour BASIC (BBC Micro)	£12.95
Advanced User Guide for BBC	**£10.95**
Amiga Machine Lang. Guide	£19.95
Archimedes 1st Step – Beginners Guide	£9.95
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Archimedes BBC Basic Guide	£20
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View 3.0 User Guide	£10
View Guide (View 2.1)	£5.00
Viewsheet & Viewstore Dabhand Guide	£12.95
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Viewstore User Guide	£10
Wordwise + A User Guide	£10.95
Z88 – A Dabhand Guide	£14.95
Z88 Computing	£9.95
Z88 Magic	£14.95
Z88 Using Your	£9.95

Carriage on Books vary between £1 to £3.50, depending on their weight.

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1-2-3 Mastering Release 3	£22.95
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dBase IV – Handbook	£21.95
dBase IV – Understanding	£22.95
dBase IV – Using	£20.95
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DOS & BIOS Function – Quick Ref Guide	£6.95
DOS Instant Reference (up to 3.3)	£10.95
DOS, Mastering for Versions up to 3.3	£22.95
DOS Power Tools (includes a disk)	£39.95
DOS Plus Manual/Amstrad PC	£9.95
DOS – Programmers Ref. Manual 2nd Ed	£22.95
Excel IBM Version – Using the	£22.95
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Framework III – Mastering	£22.95
Good Software Guide – for IBM PCs	£19.95
Hard Disc Instant Reference	£10.95
Hard Disc Manage IBM PC XT AT	£19.95
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Networking Personal Computers 3rd Ed.	£20.95
Norton Programming Guide to IBM	£–
Norton Utilities – Inside the	£19.10
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Supercalc 5 – Using	£20.95
Supercalc Professional	£17.95
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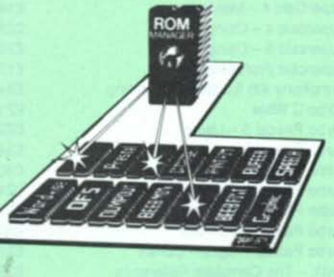

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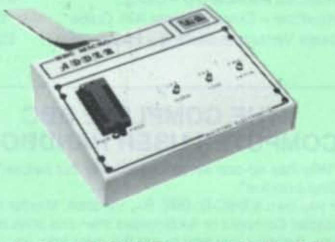

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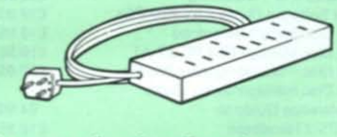

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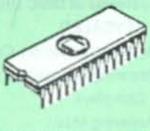

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Random strokes

Terry Blunt investigates two ways of producing unexpected events on either your 8 bit BBC Micro or 32 bit Archimedes series or BBC A3000

IF you're writing a machine code game – educational or arcade – for either the BBC Micro or Archimedes one of the most useful routines is one to produce random numbers.

One way to get them is to peek the hardware clock location, but this isn't guaranteed to work on all machines and because it changes sequentially, accessing it too rapidly produces a predictable sequence.

What is needed is a routine for producing a sequence of unpredictable numbers the way Basic does. In fact, even these are not really random since each is derived from the previous one – but you'd be hard pressed to work out what comes next.

Listing I is the solution for the 8 bit BBC Micro, it's a very short routine and as the test routine shows, provides a very evenly distributed set of results. Simply type it in, check it against the checksums to ensure you've made no typing errors and save before running it.

You can extract the necessary code from the procedures *init* and *assemble*. The test routine shows how to call it from Basic but you might as well use the built-in RND command.

Its obvious use is from machine code, where you simply jump to the entry point. The *A* register is corrupted, *Y* is set to zero on exit and you can pull the four byte random number from *seed+0* to *seed+3*. If you only want two or one byte random numbers use the first or first and second bytes of the result.

The 32 bit Archimedes series and BBC A3000 are just as well catered for with Listing II.

Again it's a very short routine for you to type in. Use the checksums to ensure you've got it right and then save it. It provides a graphic display of the distribution of values attained. In this 32 bit version the random number is returned in register zero.

Both routines return a four byte integer value which will range between 2147483647 and -2147483648. You'll probably need to reduce this to a suitable range for your program and while you can use division this is very inefficient and slow.

A better ploy is to use an AND operation with something close to the range you require and modify your needs to match the results. Using this you get:

n AND 1	0 or 1
n AND 3	0 to 3
n AND 7	0 to 7

and so on, where *n* is the value returned from the random number routine. But remember that:

n AND 5

will not yield all the numbers between 0 and 5 instead you get 0, 1, 4 or 5 (see the adjoining panel for an explanation). So if you want ranges which are not powers of two you will have to resort to division.

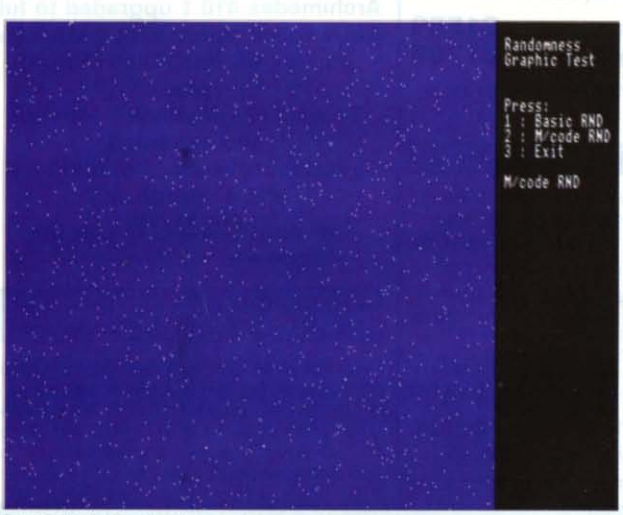
One feature of micro-generated random numbers is that any given set can be repeated as long as you start with the same *seed*.

This is very useful when you are testing a piece of software – like a simulation – and want to make changes to the program but repeat the sequence of events it's dealing with.

To ensure you get the same numbers set the value of *seed* before you start. In the listings *seed* is set to a random number from Basic at the time of assembly.

So there you have it two routines that provide an easy way to produce unpredictable events on your micro.

Turn to Page 109



Smooth distribution of random numbers

Limiting the numbers

The easiest way to limit the range of the random numbers generated is to use the AND operation. This works perfectly for any number which is a power of two less one – 2n-1 – but using any other value causes problems.

We can draw a table, in binary, showing exactly what is happening if we try to get a range from zero to five:

n	AND 5	=
0000 (0)	0101	0000 (0)
0001 (1)	0101	0001 (1)
0010 (2)	0101	0000 (0)
0011 (3)	0101	0001 (1)
0100 (4)	0101	0100 (4)
0101 (5)	0101	0101 (5)
0110 (6)	0101	0100 (4)
0111 (7)	0101	0101 (5)

Any value of *n* greater than five will always give either 0, 1, 4 or 5.

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The software to drive the tablet is supplied as a module to operate within the RISC OS desktop environment. Once loaded, several commands are available to control the tablet:

turn the tablet on or off
select relative or absolute coordinates etc.
change puck movement sensitivity

Three of the puck buttons act as standard mouse buttons and the fourth allows special operations such as changing the size of the tablet work area.

The tablet can virtually take over all the functions of a mouse making the use of graphics packages much simpler. The puck has a set of cross-wires which allow simple and accurate transfer of technical drawings. The optional stylus will make tracings, line drawings etc much easier and more accurate.

The standard Archimedes mouse or a Tracker Ball can be left connected and can even be used as alternatives for some operations.

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Giving voice to the Arc

Ian Waugh tries out a sound creation tool for the Archimedes – and finds it strikes a reasonable balance between complexity and versatility

THE purpose of the Archimedes Voice Generator, AVG for short, is to help users create sounds. It can produce standard Archimedes relocatable voice modules which are accessible from all forms of program, including music packages such as Acorn's Maestro. It has been tested under Arthur 1.2 and Risc OS 2.0 – although it doesn't use windows or multi-task – and requires 1Mb of memory.

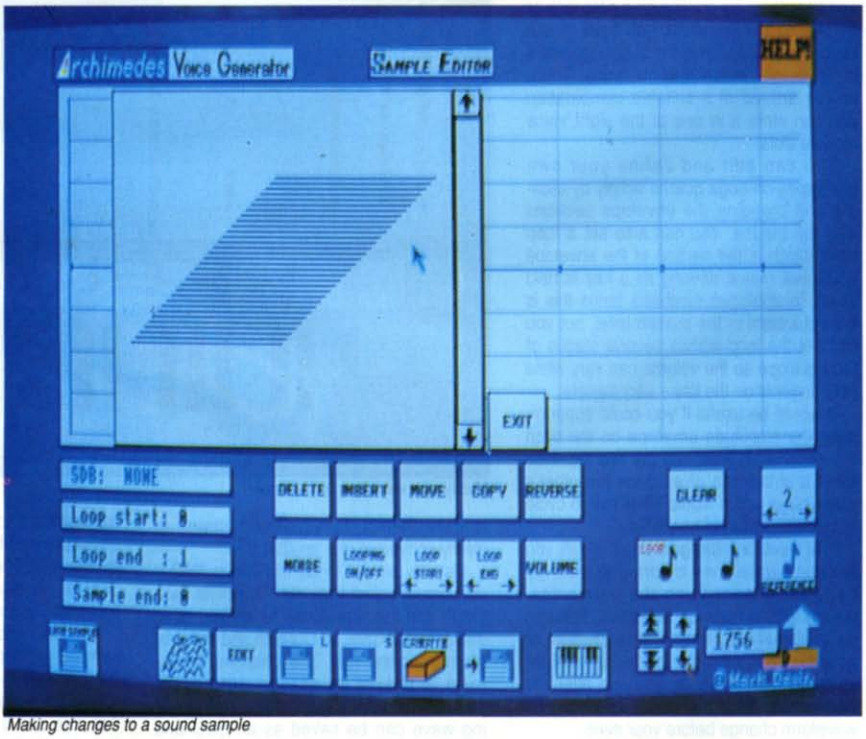
To begin you must set a suitable amount of sprite workspace using *CONFIGURE SpriteSize and check that SpriteExtend and the Sound Modules are not unplugged.

Operation is through a series of nested menus. The main one contains five icons which each lead to sub-menus containing up to eight levels, which in turn may lead to further sub-levels.

It's not as complicated as it may sound, as you can't skip from sub-level to sub-level without going back to the main menu – so you shouldn't get lost.

The five items on the main menu lead to the following screens, or modes as the manual calls them:

- The Realtime Synthesis Editor is used to create relocatable voice modules – up to eight voices – from a combination of waveforms, amplitude and pitch envelopes.
- The Interpolation Editor is used to create sound data blocks by combining a number of waveforms. SDBs are the common data structure of the package and are the equivalent to a sound sampled at 20.833KHz.
- The Harmonic Editor allows you to create SDBs by selecting up to eight harmonic partials, each with its own amplitude envelope.
- The Sample Editor let's you manipulate a loaded sample or SDB and edit it with a range of facilities. You can load and manipulate samples taken from program discs or created with a proprietary Archimedes sampler.



SDB: NONE
Loop start: 0
Loop end : 1
Sample end: 0

Making changes to a sound sample

- The Disc Utilities Page lets you Copy, Move, Rename and Delete files and there are also Compact and Format options.

Sounds created with realtime synthesis use less memory than sampled sounds. They are also precisely defined, so you can create the exact waveforms you want, although their tone will remain constant throughout their duration.

The default demo library contains 19 waveforms, 16 amplitude envelopes and 15 pitch envelopes. The waveform determines the tone or timbre of the sound, the amplitude envelope determines how the volume of the note varies with time – for example, does it die away slowly like a sustained note on a piano, or does it last for a very short time like a bass drum? And the pitch envelope adds modulation such

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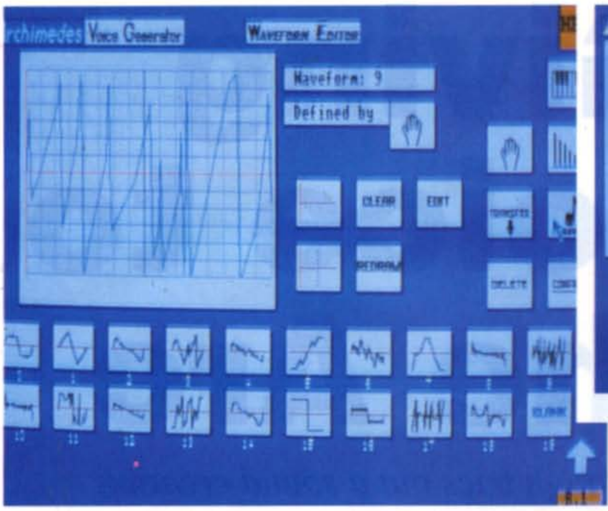
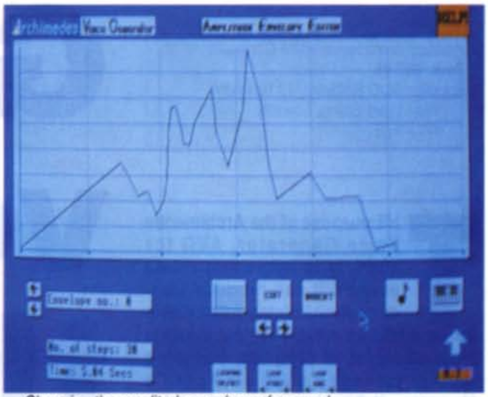


Altering a waveform by its envelope



Changing the amplitude envelope of a sound

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as vibrato – usually a gentle variation in pitch.

In the create page you can select any combination of waveform and envelopes and hear them by clicking on a note icon or by playing the keyboard. You have to exit keyboard mode, however, to change wave or envelope, which is a nuisance. When you've arrived at a suitable combination you can store it in one of the eight voice module slots.

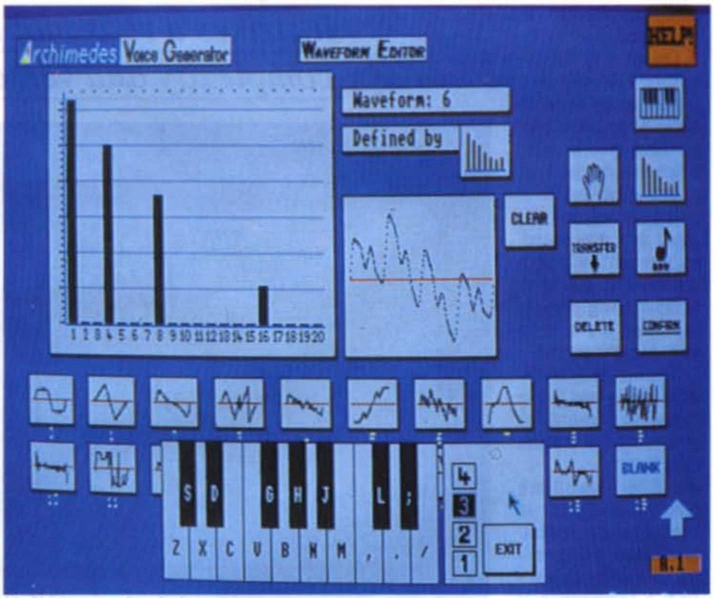
You can edit and define your own envelopes on large graphs simply by clicking and dragging the envelope sections with the mouse. You can also set a loop point which is the section of the envelope which will repeat as long as a key is held down. In analogue synthesis terms this is the equivalent of the sustain level, but you can set the loop across several stages of the envelope so the volume can vary while your finger is on the key – very flexible.

It would be useful if you could superimpose the amplitude envelope on the pitch envelope, or at least see the two together. Even a small icon of each on the other's graph page which would allow you to cycle through them would be useful.

The waveform designer page allows you to create waveforms by drawing them by hand or by specifying the harmonics. Armed with a book on acoustics, this can be extremely rewarding. Any student of acoustics or synthesis will find it ideal for studying waveforms as you can alter the harmonics, hear the result and see the waveform change before your eyes.

You can save and load your work, of course, and the library transfer function allows you to build a custom set of sounds from a variety of sources.

The waveforms created in the realtime editor are static, that is they produce the same tone colour or timbre throughout their duration. The wave interpolation editor is used to create waveforms which change timbre. The manual describes this as being similar to the cartoon process of in-betweening, in which one image is slowly converted into another one.



Modifying a waveform by harmonic

It's very simple to do this within AVG – you simply select a number of points on a graph and the waveforms which you want interpolated. Click on Confirm and the program does the rest. The changing waveform is drawn on screen during the process – fascinating to watch. The resulting wave can be saved as an SDB and read into the Sample Editor. When experimenting with the envelopes it would save a little time if you could access the editors and various other areas of the program such as file handling from anywhere within the package. The window environment is very useful for this sort of thing and could have been used effectively.

The harmonic editor is slightly more complex to use. It allows you to build up a composite waveform by combining several harmonics each with its own amplitude envelope. You have the first 32 harmonics to play with. The result can be saved as an SDB or you can go directly to the Sample Editor and process the wave there.

Anyone who has used a micro-based sampler will find similarities between it and AVG's Sample Editor. The sample is shown on a graph as a solid outline. You can also see it in 3D – although it cannot be edited in this form – and you can move a marker through it which will show, in a separate graph window, the actual waveform at each point it passes over.

There are several editing facilities such as delete, insert, move, copy and reverse – always good for a laugh, this. You can add white noise to produce a breath or chiff effect and you can set a looping point.

If you've used other samplers there are

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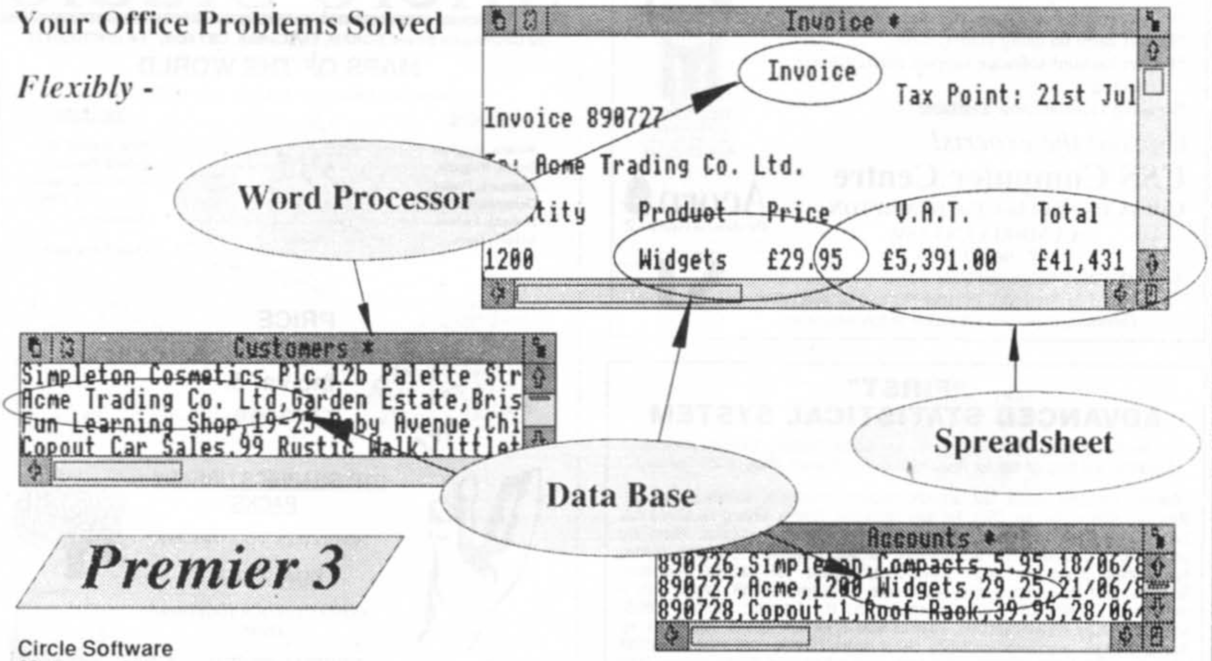

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a few facilities you may miss such as magnify, fade in and out, and echo and reverb. A facility to help produce glitch-free loops would have been helpful, too.

Whichever editor you use, the final sound needs to be saved as an SDB. One advantage of an SDB over a sample is that it has the same duration at whatever pitch it is played.

To increase the pitch of a sample you must play it back at a faster speed, resulting in a shorter duration. Eight SDBs, then, can be combined to form a voice module. These can be either multi-voice or multi-layer format: In the former, software will recognise eight separate samples, in the latter the samples are spread an octave apart and the software will select the one nearest to the pitch to be played, resulting in far more accurate representations of acoustic instruments. There are several samples, SDBs and voice modules on a data disc for you to study and experiment with.

The final manual should included programming examples on how to use the voice modules, although I found it fairly easy to use a voice module from within Maestro.

The final menu option is a set of disc-handling facilities including delete, move, copy, rename, format, compact and prepare – to set up directories for use with AVG data. There is also an AVG info option which gives information about AVG-related files.

A niggle here concerns the number of options you have to select in order to format a disc – seven. Rather annoyingly, some require mouse clicks while others ask you to tap a key.

If the software had been written to be multi-tasking this part of the program wouldn't even have had to have been written.

AVG has 35 pages of on-screen help information and mini-helps for icons are available by clicking on them with the Right mouse button. Some of the menu screens are pretty sparse and it would have been helpful, especially for newcomers to the world of synthesis and sound creation, if the icons had contained their full names and a little more information. There's plenty of space to make them larger.

The manual supplied with the review copy was provisional and a new one is proposed containing both a tutorial and an introduction to the theory of sound.

Some knowledge of sound, waveforms, envelopes and acoustics is certainly required to get the best out of the package, although you can, as the review copy suggests, play it by ear.

As acoustics is such a potentially complex subject I hope the release version of the manual explains it well and includes helpful diagrams. Some aspects of the, admittedly provisional, manual could be a little clearer.

I discovered a few bugs which occurred primarily when trying to create too many envelopes, but these should soon be sorted out by MJD.

Full Risc OS compatibility would be very nice, too.

AVG is an excellent package and does its best to strike a balance between complexity and versatility.

It could well become the sound creation tool for musicians and programmers wanting to produce music on the Archimedes.

It would be extremely useful in education, too, for the study of sound, waveforms and harmonics.

Summing up

A superb tool for anyone wishing to experiment with sound samples or waveform and envelope generation and creation.

Most of the minor niggles I found with the package were due to the fact that the program hadn't been written for the multi-tasking environment.

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From Page 99

Listing I

```
  10 REM > RndArc
  20 REM by Terry Blunt
  30 REM (c) The Micro User
  40 :
  50 MODE 12:OFF
  60 ON ERROR PROCerror:END
  70 :
  80 PROCinit
  90 PROCassemble
 100 PROCtest
 110 PROCquit
 120 END
 130 :
 140 DEF PROCerror
 150 ON ERROR OFF:PROCquit
 160 REPORT:PRINT" at line ";ERL
 170 ENDPROC
 180 :
 190 DEF PROCquit
 200 MODE MODE
 210 ENDPROC
 220 :
 230 DEF PROCinit
 240 DIM code 56
 250 sp   =13
 260 link=14
 270 pc   =15
 280 ENDPROC
 290 :
 300 DEF PROCassemble
 310 FOR pass=0 TO 2 STEP 2
 320 P%=code
 330 [OPT pass
 340 ;   Random Number Generator
 350 ;   no entry parameters
 360 ;   on exit R0 contains a
random i
nteger
 370 ;
 380 .random
 390     STMFD   (sp)!,{r1-r2,link}
 400     LDR     r0,seed
 410     CMP     r0,#0
 420     MOVEQ   r0,#255
 430     MOV     r2,#17
 440 .random_loop
 450     MOV     r1,r0,asr #13
 460     EOR     r1,r1,r0,asr #24
 470     MOVS    r1,r1,ror #1
 480     ADCS    r0,r0,r0
 490     SUBS    r2,r2,#1
 500     BNE     random_loop
 510     STR     r0,seed
 520     LDMFD   (sp)!,{r1-r2,pc}
 530 .seed
 540     EQUD    RND
 550 ]:NEXT
 560 ENDPROC
 570 :
 580 DEF PROCtest
 590 VDU 28,65,31,79,0
 600 PRINT'"Randomness"'"Graphic
Test"
 610 PRINT'
 620 PRINT"Press:"
 630 PRINT"1 : Basic RND"
 640 PRINT"2 : M/code RND"
 650 PRINT"3 : Exit"
 660 Q%=2
 670 REPEAT
 680   PRINTTAB(0,10);
 690   IF Q%=1 THEN
 700       PRINT"Basic RND"SPC6
 710     ELSE
 720       PRINT"M/code RND"SPC6
 730     ENDIF
 740   GCOL 4
 750   RECTANGLEFILL 0,0,1023
 760   GCOL 7
 770   FOR Y%=0 TO 1023
 780     IF Q%=1 THEN
 790         A%=RND
 800       ELSE
 810         A%=USR(random)
 820       ENDIF
 830     PLOT 69,A%AND1023,Y%
 840     NEXT
 850   REPEAT
 860     Q%=INSTR("123",GET$)
 870     UNTIL Q%>0
 880   UNTIL Q%=3
 890 ENDPROC
```

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Get it right

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 9719 9
 50 = BA87 4
 60 = 917E C
 70 = 9719 1
 80 = DEBB C
 90 = 126A 9
100 = E0D3 4
110 = F34D F
120 = FD2E 4
130 = 9719 0
140 = 72B4 E
150 = 561A 0
160 = 6BDF D
170 = ED0F 7
180 = 9719 8
190 = 6D21 8
200 = 1A63 D
210 = ED0F A
220 = 9719 8
```

```
230 = 40D7 B
240 = 1577 8
250 = 91E5 3
260 = A0B5 4
270 = FDC5 1
280 = ED0F 6
290 = 9719 3
300 = 98A5 1
310 = B43B E
320 = 3FB3 4
330 = 4E48 D
340 = 175C 3
350 = 4F54 B
360 = E868 C
370 = 8738 3
380 = 3B13 A
390 = 7DE1 B
400 = 9E5B A
410 = 111E 1
420 = F055 2
430 = 4CE2 4
440 = D498 C
```

```
450 =  2DF E
460 = 1FB3 8
470 = 7812 A
480 = 6CAE 0
490 = 34FE 2
500 = E3B8 7
510 = 49F4 E
520 = 1574 2
530 = B6D3 2
540 = 7341 A
550 = DA42 5
560 = ED0F C
570 = 9719 B
580 = 7EBF 6
590 = 8742 D
600 = 78F7 7
610 = 7475 5
620 = A3CB 9
630 = E7F5 2
640 = D7AC 5
650 =   DD F
660 =  B61 E
670 = BFBA 0
```

```
680 = 5A44 F
690 = 7618 5
700 = F7BC 0
710 = 18C0 1
720 = DEF0 4
730 =  8E1 0
740 = 62A0 A
750 = E886 5
760 = 52C3 3
770 = 7531 8
780 = 7618 2
790 = 916F 2
800 = 18C0 4
810 = DD71 9
820 =  8E1 2
830 = AEF2 F
840 = 2C83 8
850 = BFBA 6
860 = B44E 4
870 = A93B 1
880 = CC0B 2
890 = ED0F 2
```

Listing II

```
  10  REM > RndBBC
  20  REM by Terry Blunt
  30  REM (c) The Micro User
  40  :
  50  MODE 0:VDU23;8202;0;0;0;
  60  ON ERROR PROCerror:END
  70  :
  80  PROCinit
  90  PROCassemble
 100  PROCtest
 110  PROCquit
```

➤

Get it right

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 9719 9
 50 = C501 B
 60 = 917E 7
 70 = 9719 F
 80 = DEBB 0
 90 = 126A 0
100 = E0D3 2
110 = F34D 4
120 = FD2E 8
130 = 9719 2
140 = 72B4 F
150 = 561A 5
160 = 6BDF A
170 = ED0F 9
180 = 9719 E
190 = 6D21 5
200 = DE34 D
210 = ED0F 0
220 = 9719 6
230 = 40D7 7
240 = 3667 4
250 = ED0F A
260 = 9719 1
270 = 98A5 2
280 = B43B 0
290 = 3FB3 0
300 = 4E48 2
310 =    0 2
320 =    0 2
330 =    0 2
340 =    0 2
350 =    0 2
360 = 3B13 7
370 = AC92 B
380 = 8BA7 0
390 = 123B 9
400 = 3EBD 1
410 = F888 8
420 = 458E 7
430 = 694D 4
440 = D752 4
450 = C6B0 F
460 = D498 6
470 = 6602 5
```

```
480 = 1A09 C
490 = 1A09 2
500 = 1A09 5
510 = 1A09 8
520 = 1A09 C
530 = D336 7
540 = 856E 0
550 =  B4F E
560 = 99BF 8
570 = A9DC D
580 = B9FD E
590 = F888 0
600 = 7273 F
610 = 9843 A
620 = B6D3 7
630 =  C8B 5
640 = DA42 E
650 = ED0F 5
660 = 9719 2
670 = 5E97 E
680 = 7165 8
690 = 9719 6
700 = 7EBF F
710 = 8742 B
720 = 78F7 6
730 = 7475 9
740 = A3CB 6
750 = E7F5 F
760 = D7AC C
770 =   DD D
780 =  B61 D
790 = BFBA 9
800 = E64A 9
810 = 4496 3
820 = 619B F
830 = 7531 9
840 = F300 6
850 = AEF2 B
860 = 2C83 D
870 = BFBA F
880 = B44E 2
890 = A93B D
900 = C11F 5
910 = AA59 7
920 = 18AC 6
930 = CC0B E
940 = ED0F A
```

➤

```
120  END
130  :
140  DEF PROCerror
150  ON ERROR OFF:PROCquit
160  REPORT:PRINT" at line ";ERL
170  ENDPROC
180  :
190  DEF PROCquit
200  VDU26,12
210  ENDPROC
220  :
230  DEF PROCinit
240  DIM code 47
250  ENDPROC
260  :
270  DEF PROCassemble
280  FOR pass=0 TO 2 STEP 2
290  P%=code
300  [OPT pass
310  \
320  \  no entry parameters
330  \  on exit A undefined  Y=0
340  \  random integer in !seed
350  \
360  .random
370    LDY #3
380  .random_test
390    LDA seed,Y
400    BNE random_ok
410    DEY
420    BPL random_test
430    STY seed
440  .random_ok
450    LDY #17
460  .random_loop
470    LDA seed+1
480    LSR A
490    LSR A
500    LSR A
510    LSR A
520    LSR A
530    EOR seed+3
540    ROR A
550    ROL seed
560    ROL seed+1
570    ROL seed+2
580    ROL seed+3
590    DEY
600    BNE random_loop
610    RTS
620  .seed
630    OPT FNequd(RND)
640  ]:NEXT
650  ENDPROC
660  :
670  DEF FNequd(D%)
680  !P%=D%:P%=P%+4:=pass
690  :
700  DEF PROCtest
710  VDU 28,65,31,79,0
720  PRINT'"Randomness"'"Graphic
Test"
730  PRINT'
740  PRINT"Press:"
750  PRINT"1 : Basic RND"
760  PRINT"2 : M/code RND"
770  PRINT"3 : Exit"
780  Q%=2
790  REPEAT
800    IF Q%=1 B$="Basic RND" ELSE
B$=
"M/code RND"
810    PRINTTAB(0,10)B$SPC6
820    GCOL 0,1
830    FOR Y%=0 TO 1023
840      IF Q%=1 A%=RND ELSE
CALLrando
m:A%=!seed
850      PLOT 69,A%AND1023,Y%
860      NEXT
870    REPEAT
880      Q%=INSTR("123",GET$)
890      UNTIL Q%>0
900    GCOL0,0:MOVE 0,0:MOVE 0,1023
910    PLOT 85,1023,0
920    PLOT 85,1023,1023
930    UNTIL Q%=3
940  ENDPROC
```

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Printing restriction removed

£10 *Prize letter*

I HAVE noticed that lots of 6502 text printing routines have been published over the years since the first BBC Micro appeared.

Although very useful to machine code programmers, they can only handle up to 256 bytes of text at once.

The reason for this restriction is that the Y register is used as an index, along with the original address, to point to the location of the next character to be printed. However, as the Y register can only have values between 0 and 255 there is a 256 byte limit imposed upon us.

What we need is a piece of code which includes a routine to increment the original address index high byte every time Y returns to zero. The program following includes such a facility:

The new part of the coding is very short – in fact it only comprises lines 210, 230 and 240.

Because the program stores its original index at the addresses &70 and &71 the facility is easy to incorporate.

All that is needed is a check in the main printing loop to see if Y has reached zero and, if so, to branch to the extra code.

When called it increments the contents of &71 by one because of the way the pointer is stored – most significant byte second.

Once this has been done the normal loop routine continues to execute until either a terminating byte – 255 (&FF) – is found or the incrementing routine is again required.

Note that EQUB and EQUS are used in the routine so, as it stands, it can only be run on a Basic 2 or above micro – although the resulting 6502 code will work on any 8 bit BBC Micro.

In this, and any other program containing these commands, Basic 1 owners should replace all the EQUBs *with* OPT FNequb *and a* EQUS *becomes* OPT FNequs *as shown in these example lines:*

```
   290 OPT FNequb(22):OPT F
Nequb(7):OPT FNequb(141)
   300 OPT FNequs("The Micr
o User"):OPT FNequb(13)
   330 OPT FNequs(STRING$(1
4,"'"))
   350 OPT FNequs(string$)
```

The functions should be defined as follows:

```
   520 DEF FNequb(B%)
   530 ?P%=B%:P%=P%+1:=L%
   540 DEF FNequs(S$)
   550 $P%=S$:P%=P%+LENS$:=
L%
```

Using the text printing routine it is theoretically possible to have a text up to 64k – 65536 bytes – in length. However in practice this is not possible because of memory area restrictions.

This means that the routine should be sufficient for all your text printing needs. – **Pete H.N. Dawes, Manchester.**

```
   10 REM 16 Bit Text Prin
ting Routine
   20 REM by P.H.N.Dawes
   30 REM (c) The Micro Us
er
   40 MODE7
   50 string$=CHR$134+"Thi
s is a string of test text
."+CHR$13
   60 FOR L%=0 TO 3 STEP 3
   70 P%=&900:[OPT L%
   80 .main
   90 LDX #text MOD 256
  100 LDY #text DIV 256
  110 JSR print:RTS
  120 .print
  130 LDA &70:PHA
  140 LDA &71:PHA
  150 STX &70:STY &71
  160 LDY #0
  170 .print2
  180 LDA (&70),Y
  190 CMP #255:BEQ print4
  200 JSR &FFE3:INY
  210 CPY #0:BEQ print3
  220 JMP print2
  230 .print3
  240 INC &71:JMP print2
  250 .print4
  260 PLA:STA &71
  270 PLA:STA &70:RTS
  280 .text
  290 EQUB 22:EQUB 7:EQUB
 141
  300 EQUS "The Micro User
":EQUB 13
  310 EQUB 141:EQUS "The M
icro User"
  320 EQUB 13:EQUB 145
  330 EQUS STRING$(14,"`")
  340 EQUB 13:EQUB 13
  350 EQUS string$
  360 EQUS string$
  370 EQUS string$
  380 EQUS string$
  390 EQUS string$
  400 EQUS string$
  410 EQUS string$
  420 EQUS string$
  430 EQUS string$
  440 EQUS string$
  450 EQUS string$
  460 EQUS string$
  470 EQUS string$
  480 EQUS string$
  490 EQUB 13:EQUB 255
  500 ]:NEXT
  510 CALL &900
```

Incorrect EVALuation

THE Countdown program printed in the letters column of the January issue of The Micro User *does not seem to give the correct answer.*

The EVAL statement works in the micro's own logical order – first evaluating any multiplication sign wherever it may be.

So if that is the last sign in the equation the last two figures are multiplied together before any other part of the sum is worked out.

This results in the micro giving as an answer an equation the results of which are nothing like the number expected if you work out from left to right, as humans do.

So 4+2-5x7 will result in -29 using an EVAL statement, but only 7 if we do it in our heads. – **Jim Morrell, Kingston Upon Hull.**

● The EVAL function in the BBC Micro is designed to work as it does because it is mathematically the correct way. Any good calculator – and in fact most cheaper ones – also work in the same way. So, using the example 4+2-5x7 it should result in -29 whether done mentally, by using EVAL or on a calculator.

This correct method of evaluation is often refered to in maths as the BODMAS rule.

This means that expressions in Brackets are calculated first – starting at the innermost set – then Order – powers and so forth – then Division, Multiplication, Addition and Subtraction in that order.

So, if you want to obtain 7 from 4+2-5x7 you need to use brackets: (4+2-5)x7.

➤

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

Compact rom boards

AS the owner of a Master Compact that is literally overflowing with roms I would like to know if there are any companies manufacturing a rom board – either internal or external – or considering doing so for the micro.

Since it is used mainly as an educational tool for children aged between four and eight, it is not feasible to be constantly leaving the micro case unbolted to enable frequent changing of roms.

I also understand that around 70,000 Compacts have been sold, making a rom board market quite a reasonable proposition. – **Mrs. G. Clinch, Gatow.**

● Until recently, we did not know of any rom boards for the Compact. However, Jafa Systems (0222 887203) has now released an adaptor to allow Master or Electron cartridges to fit the Compact.

They also supply a rom/ram board to fit into this so you can plug in up to eight roms or a combination of roms and ram.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Archimedes landscapes

AFTER playing Zarch on the Archimedes I attempted to write a program which produced random landscapes based on the same design as the game itself. The resulting program is just five lines long, including REM statements:

```
   10 REM Zarch imitation
landscapes
   20 REM by Mark Holton
   30 V=13:P=0:M=11:G=64:D
IM X(V,M),Y(V,M),S(360):D=
0:FOR S=0 TO 2*PI STEP PI/
180:S(D)=SIN(S):D=D+1:NEXT
:FOR B=1 TO M:FOR A=1 TO V
:X(A,B)=-109+107*(A-A*B/21
+B/3):NEXT,:REPEAT:FA=0.15
*RND(100):FB=0.15*RND(100)
:F=FA/15:FOR Y=1 TO M
   40 D=1:FOR X=1 TO V:D=D
+F:Y(X,Y)=27.7*Y+(S(D*FA M
OD 360)+S((P+D*FB)MOD 360)
)*G+50:NEXT:P=P+20:NEXT:MO
DE 4:FOR Y=1 TO M:MVE X(1,
Y),Y(1,Y):FOR X=1 TO V:DRA
W X(X,Y),Y(X,Y):NEXT,:FOR
X=1 TO V:MOVE X(X,1),Y(X,1
):FOR Y=1 TO M
   50 DRAW X(X,Y),Y(X,Y):N
EXT,:UNTIL 0
```

The routine can produce some quite amazing results, each taking just five seconds to both calculate and draw. – **Mark Holton, Southminster, Essex.**

● It just goes to show how easy it is to write a short listing that is capable of producing graphics quite literally out of this world.

So what about a version for the 8 bit BBC Micro then. Any offers?

UIM ratings upheld

I HAVE been reading The Micro User *letters column for nearly four years now, but have never seen a letter so far from the point as that of John Salt concerning the UIM game by the 4th Dimension.*

The obvious reason why this product was given such high ratings by the reviewer was because of the myriad of different features it contained, such as commodity trading, share trading and currency as well as the vast number of ships, ports, networks and equipment you will find, to name but a few.

As for the missions, did Mr. Salt complete the undocumented voyages of the original Elite – without enlisting the help of Hac Man or the Mad Hatter?

Has he even attempted to pass through the Anarchy Zone of Elite?

The comments Mr. Salt made were totally unjustified about an excellent game which is on a par with, if not greater than, the mighty Elite itself.

In time UIM will collect a great gathering of supporters as it deserves.

The reviewer was justified in giving the ratings he did – not biased as Mr. Salt suggested. – **Robert Mattey (Elite), Billerkay, Essex.**

RiscOS Dickie Brickie

RECENTLY received the March edition of The Micro User *along with the Archimedes subscription disc.*

To my dismay when I tried to run the Dickie Brickie game I was confronted by the error message File TAPE not found at line 3080.

*After checking the listing I realised that the problem was with a *TAPE command, which the operating system was not recognising.*

However, on removing this and trying again the computer simply froze.

Can you help? – **M. Stribblehill (age 10), Halesowen, West Midlands.**

● Dickie Brickie is not designed to run straight from the RiscOS desktop, but it can be made to work under the

Graphics file compressed

THERE is a simple, but not very well known, technique on both the BBC Micro and Archimedes series of micros which allows complex graphics to be stored on a disc without the need for saving the screen memory as a long data block.

*At the start of the routine which produces the graphics – Basic or assembler – add a *SPOOL <filename> command, where filename is the name under which the file is to be saved. Then at the end of the routine simply add *SPOOL.*

Using this method all VDU commands are sent to a file. Because instructions such as PLOT, MOVE and DRAW all use VDU sequences to create their effects, we can use this facility to store all the commands necessary to create the graphics screen in a short file.

If you want to create a sequence of screens that appear in order after each press of a key each single screen must be stored in a seperate file.

*The reason for this is that the time delay loops that you may be using will not be sent to the file that has been *SPOOLed, and instead any MODE changes or CLS commands will be performed instantly.*

*Once you have created all the screens you just need a short program to take care of loading each in order, providing delay loops between each one. The delay loops need be nothing too elaborate, REPEAT UNTIL GET is sufficient. To reload your saved screen file, just type *EXEC <filename>: The screen will not be instantly there, but after a few seconds will have been fully redrawn.* – **Paul J. Mason (age 13), Grantham, Lincolnshire.**

● This method, as you mention, is not at all new but also not very well known. Its most common use is by software houses which produce long adventures.

As they only have a relatively small amount of disc space on which to store both text and graphics, the *SAVE approach was obviously not viable. Because the length is kept so short using this method it was the natural alternative.

BBC emulator. The process is as follows.

- Insert applications disc two.
- Double-click on !65Host.
- Remove the disc.
- Insert the March monthly
- CHAIN "Game1".

After doing this the game will run correctly, albeit slightly slowly and without any sound effects.

Screen Quest loading

*ANYONE who has experienced the Watford Electronics Quest Paint package may have noticed that the program will load a Mode 1 screen correctly, but after saving one using the package it cannot be *LOADed back without strange effects occurring.*

The fault, which sometimes results in only half the screen appearing, can be remedied with the program shown:

```
   10 REM Quest screen con
vertor.
   20 REM by A.L.Smith
   30 MODE1
   40 INPUT "Name of Quest
 file :"A$
   50 INPUT "Name of file
to save :"B$
   60 IF B$=A$ THEN PRINT
"Names are the same. Conti
nue? (Y/N)" ELSE 80
   70 D$=GET$:IF D$<>"Y" A
ND D$<>"N" THEN 70 ELSE IF
 D$="N" THEN 50
   80 CLS
   90 OSCLI("LOAD "+A$+" 2
C00")
  100 REPEAT UNTIL GET
  110 OSCLI("SAVE "+B$+" 2
C00 +5000 3000 3000")
  120 CLS:OSCLI("LOAD "+B$
):END
```

– A.L.Smith, Rainford, Merseyside.

● This is a useful routine, but will not work on Basic 1 because it contains the command OSCLI. As with all listings and letters submitted to us, we would be grateful if contributers could avoid Basic 2-specific commands.

To allow the routine to work on Basic 1 this should be replaced with PROCos and the following lines added to the program:

```
  130 DEF PROCos($&700):L
OCAL X%,Y%
  140 Y%=7:CALL&FFF7:ENDP
ROC
```

More lives than a cat

IN the Hac-Man articles all the cheats presented are for commercial games. But as all the listings published in The Micro User are good, I have written cheats for some of them to provide you with infinite lives.

To make each cheat work, load the original game and then make the specified changes. It is a good idea to copy the original games on to a blank work disc before making any alterations so that the original versions are not lost.

Here are my cheats.

5-Alive – June 1989
Load part two into memory. Change liv%=liv%-1 on line 1450 to liv%=6.

Fred Drip – July 1989
Alter the li%=li%-1 in line 2330 to li%=3.

The Gate – August 1989
In line 1280 change LI%=LI%-1 to LI%=3.

Crystal Sea – September 1989
List line 1190 and change N%=N%-1 to N%=3.

Snowman's Revenge – January 1990
In line 180 alter sh%(I)=3 to sh%(I)=x where x is the number of shields required.

Dickie Brickie – March 1990
Load part two of the game. Change lv%=lv%-1 to lv%=3 in line 2260.

Once the games have been altered, save them under their original filenames on your new work disc and then you are all set to play. Happy cheating. – **James Page (age 12), High Wycombe, Buckinghamshire.**

£10 *Prize letter*

Tree sorts sorted

I READ with great interest the feature about tree sorts by Anton Mans in the February issue.

I agree with Dr. Mans' method of sorting, but have written a faster version, presented here. In Dr. Mans' program the routine could sort 10,000 words in 108 seconds on an Archimedes. My version reaches the same objective in only 82 seconds.

The setup of the tree is accomplished by one procedure only – PROCdirection – with inputs of the node of the tree and the branch of the node.

I have attempted putting lines 280 to 330 inclusive in a separate procedure, but this only resulted in an increase of time by 15 per cent overall, thus defeating the object of the new program.

However, I do believe that it is still simple enough to follow the system in which the recursion is accomplished within this procedure. – **E.D.Englehardt, The Netherlands.**

```
   10 REM ><Current$Dir>.
3TreeSort
   20 REM by E.D.Englehard
t
   30 REM For Basic V
   40 REM (c) The Micro Us
er
   50 DIM word$(word%),ind
ex_sort%(word%)
   60 PROCindex_sort_tree(
word$())
   70 END
   80 DEFPROCindex_sort_tr
ee(name$())
   90 LOCAL num%,inx%,poin
ter%()
  100 DIM pointer%(DIM(nam
e$(),1),1)
  110 FOR num%=2 TO word%
  120 IF name$(num%)<=name
$(1) THEN
  130 PROCdirection(1,0)
  140 ELSE
  150 PROCdirection(1,1)
  160 ENDIF
  170 NEXT
  180 PROCindex_sorted(1)
  190 ENDPROC
  200 DEFPROCdirection(nod
e%,dir%)
  210 IF pointer%(node%,di
r%)=0 THEN
  220 pointer%(node%,dir%)
=num%
  230 ELSE
  240 IF name$(pointer%(no
de%,dir%))>=name$(num%) TH
EN
  250 PROCdirection(pointe
r%(node%,dir%),0)
  260 ELSE
  270 PROCdirection(pointe
r%(node%,dir%),1)
  280 ENDIF
  290 ENDIF
  300 ENDPROC
  310 DEFPROCindex_sorted(
num%)
  320 IF num%<>0 THEN
  330 PROCindex_sorted(poi
nter%(num%,0))
  340 inx%+=1:index_sort%(
inx%)=num%
  350 PROCindex_sorted(poi
nter%(num%,1))
  360 ENDIF
  370 ENDPROC
```

Sounds fantastic

I USE my BBC Micro a lot with my Hybrid Music 5000, but I also run many programs that use the built-in sound, some of which are very good.

When I saw the Sound Blaster advertised I immediately bought it but found that although the sound quality improved mains hum became more noticeable. I have been forced to move my system away from the family stereo unit, which means that my Music 5000 became useless as it doen't have its own loudspeaker.

But a quick bit of work with the soldering iron and a DIN plug soon had my Sound Blaster plugged straight into the Music 5000 – and it worked pefectly.

Now I get full volume and good quality without the need for a hi-fi system and it's a lot more portable. – **Peter Stevenson, Wirral.**

● We've contacted the Sound Blaster manufacturers and with our special offer – see Page 114 – you can buy it with connectors for the Archimedes and A3000, 8 bit BBC Micro or the Music 5000 or Music 500.

SOFTWARE Bargains AND Mercury Games

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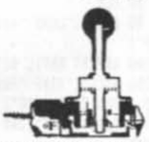
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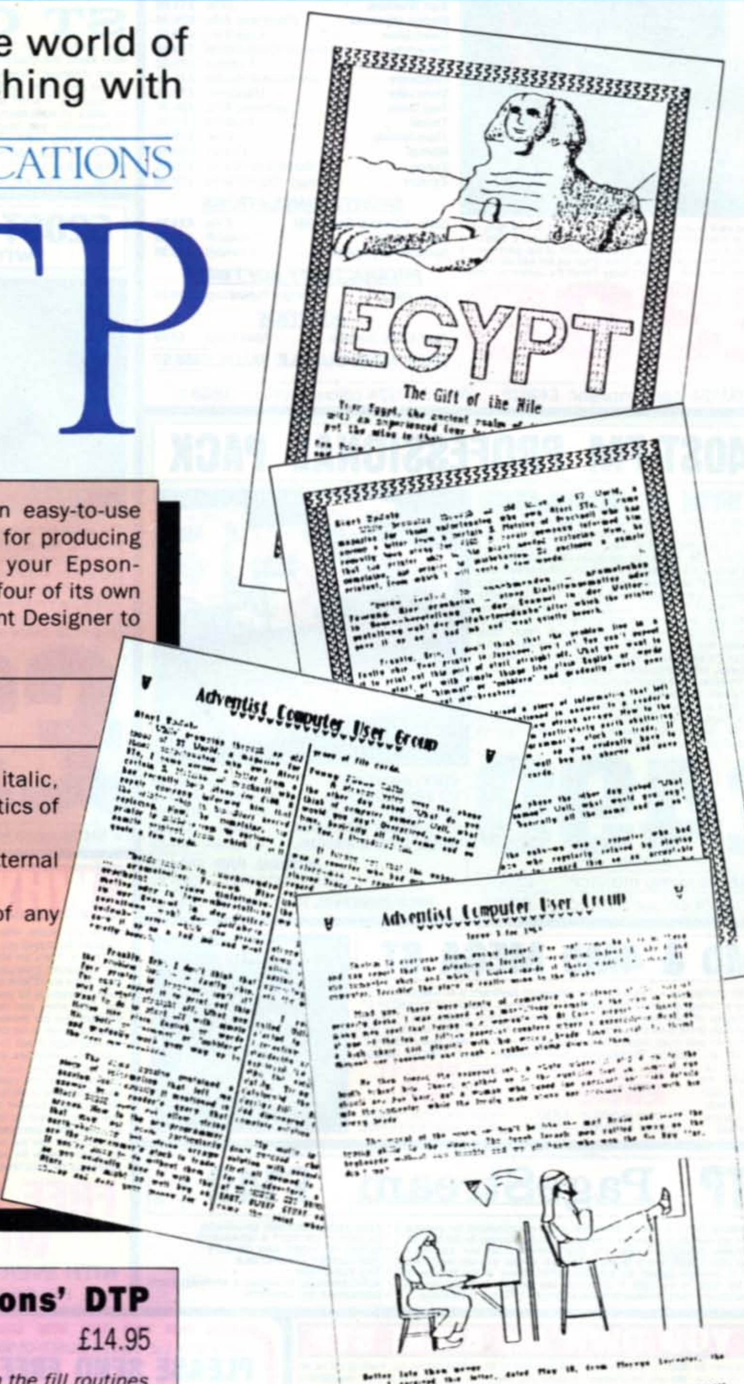

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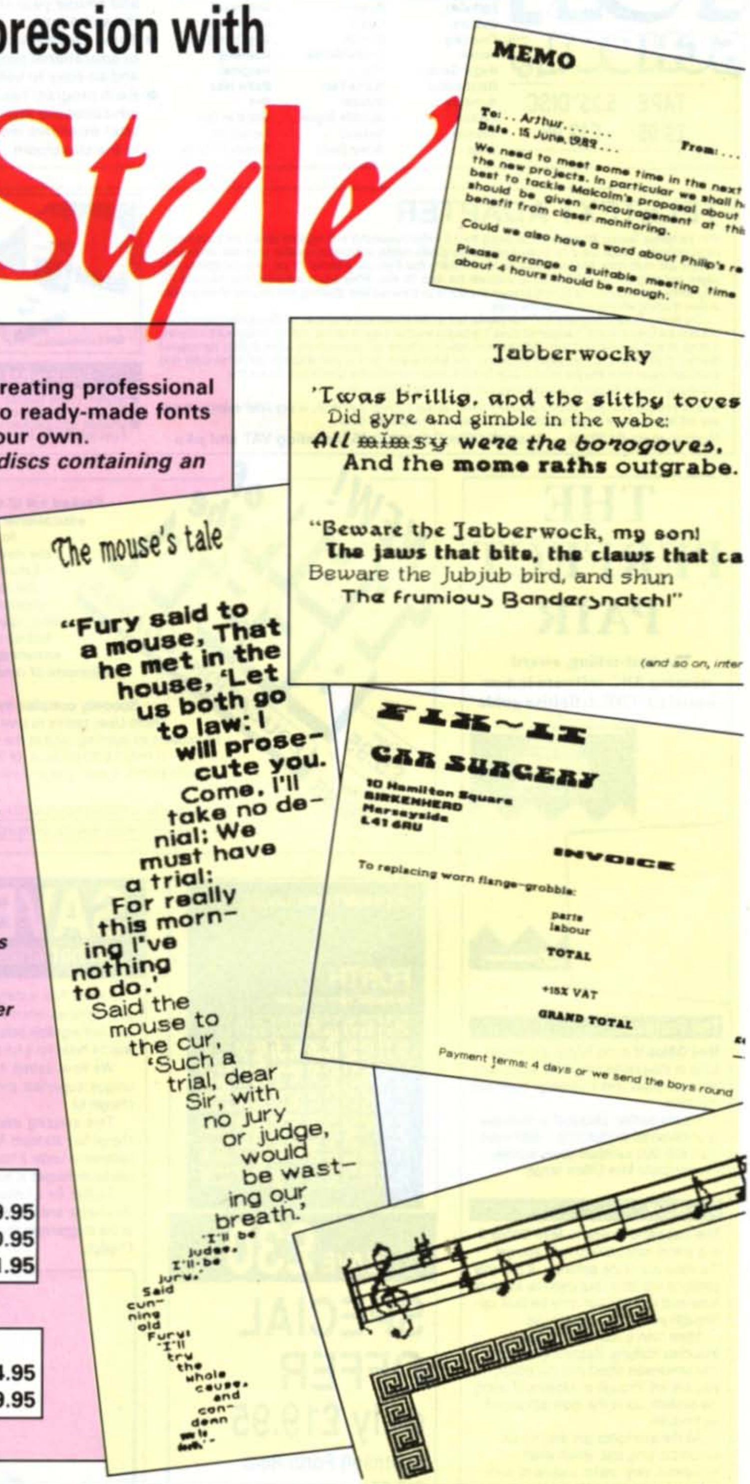

MEMO

To: .. Arthur........
Date . 15 June, 1989 ...
From: ...

We need to meet some time in the next the new projects. In particular we shall h best to tackle Malcolm's proposal about should be given encouragement at thi benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the **mome raths** outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inter

The mouse's tale

"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial: We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury:
'I'll
try
the
whole
cause,
and
con-
demn
[illegible]
[illegible]'"

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(see page 117)

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(see page 115)

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(see page 32)

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From Page 63

Listing I

```
   10 REM>$.KeySRC
   20 REM The Hot Key system
   30 REM by Gareth S. Long
   40 REM (c) The Micro User
   50 CLS:PROCinit:PROCassm:PROCsave:END
   60 DEFPROCinit
   70 Module$="$.Modules.HotKey"
   80 Version$="1.00"
   90 Date$="(27 Oct 1989)"
  100 buff%=&4000
  110 DIM code% buff%
  120 FORI%=code% TO (code%+buff%) STEP
4:!I%=0:NEXT
  130 keystatus=0
  140 inuse=4
  150 key=8
  160 ENDPROC
  170 DEFPROCassm
  180 FORI%=4TO6STEP2
  190 P%=0:O%=code%
  200 [  OPT I%
  220    EQUD    0
  230    EQUD    initialise
  240    EQUD    finalise
  250    EQUD    service
  260    EQUD    titlemess
  270    EQUD    helpmess
  280    EQUD    commandtable
  290 .titlemess
  300    EQUS    "HotKey"+CHR$0
  310    ALIGN
  320 .helpmess
  330    EQUS    "Hot Keys"+CHR$9+Versio
n$+" "+Date$+CHR$0
  340    ALIGN
  350 .initialise
  360    STMFD   r13!,{r0-r6,r14}
  370    LDR     r0,[r12]
  380    CMP     r0,#&00
  390    LDRNE   r12,[r12]
  400    BNE     restart
  410    MOV     r0,#&06
  420    MOV     r1,#&20
  430    MOV     r3,#&100
  440    ADD     r3,r3,#&0C
  450    SWI     "XOS_Module"
  460    LDMVSFD r13!,{r0-r6,r14}
  470    ADRVS   r0,initerror
  480    ORRVSS  pc,r14,#&10000000
  490    STR     r2,[r12]
  500    LDR     r12,[r12]
  510    MOV     r0,#&00
; Change to &FF to start active
  520    STR     r0,[r12,#keystatus]
  530    STR     r0,[r12,#inuse]
  540    MOV     r0,#&80
; Default 'print' key
  550    STR     r0,[r12,#key]
  560    ADR     r0,default
  570    SWI     "XOS_CLI"
  580    ADR     r0,grabscreen
  590    SWI     "XOS_CLI"
  600    ADR     r0,grabscreen2
  610    SWI     "XOS_CLI"
  620    LDMFD   r13!,{r0-r6,pc}
  630 .restart
  640    LDR     r0,[r12,#keystatus]
  650    CMP     r0,#&00
  660    MOVNE   r0,#&14
  670    ADRNE   r1,keypress
  680    MOVNE   r2,r12
  690    SWINE   "OS_Claim"
  700    LDMFD   r13!,{r0-r6,pc}
  710 .finalise
  720    STMFD   r13!,{r0-r6,r14}
  730    LDR     r12,[r12]
  740    LDR     r0,[r12,#keystatus]
  750    CMP     r0,#&00
  760    MOVNE   r0,#&14
  770    ADRNE   r1,keypress
  780    MOVNE   r2,r12
  790    SWINE   "OS_Release"
  800    LDMFD   r13!,{r0-r6,pc}
  810 .service
  820    STMFD   r13!,{r0-r6,r14}
  830    LDR     r12,[r12]
  840    CMP     r1,#&27
  850    BEQ     restart
  860    LDMFD   r13!,{r0-r6,pc}
  870 .keypress
  880    STMFD   r13!,{r0-r6,r14}
  890    CMP     r1,#&00
  900    LDMNEFD r13!,{r0-r6,pc}
  910    LDR     r1,[r12,#inuse]
  920    CMP     r1,#&00
  930    LDMNEFD r13!,{r0-r6,pc}
  940    LDR     r1,[r12,#key]
  950    CMP     r0,r1
  960    LDMNEFD r13!,{r0-r6,pc}
```

➤

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```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 =    0 0
  50 = 78FA A
  60 = 344C A
  70 = 9652 7
  80 = 6454 5
  90 = 9E19 B
 100 = 5FE7 4
 110 = 44DC B
 120 =  30F C
 130 = 5DAF 4
 140 = D590 5
 150 = 92BF C
 160 = ED0F 7
 170 = DF1D F
 180 = B14B 5
 190 = AAAE 7
 200 = 5DBC 2
 220 = D2AA A
 230 = 6DC5 F
 240 = 8BFB 7
 250 =  120 9
 260 = B063 3
 270 = 13E8 1
 280 = B0C9 D
 290 = CB9A 0
 300 = BF8D 5
 310 = 24FA B
 320 = C718 D
 330 = 13CF F
 340 = 24FA 9

 350 = 5B39 4
 360 = 6C3F D
 370 = D42B 6
 380 =  1B8 8
 390 = 929A 8
 400 = E806 7
 410 = E9F9 F
 420 = AAFD A
 430 = E640 2
 440 =  494 8
 450 = FF19 5
 460 = E784 5
 470 = A1E9 0
 480 = 4FA9 3
 490 = A052 2
 500 = F390 3
 510 = 2B05 4
 520 = A9D2 2
 530 = 48D3 4
 540 = 7AA8 4
 550 = 5C48 4
 560 = 7F80 6
 570 = 7D39 1
 580 = 650C 2
 590 = 7D39 D
 600 = 2612 3
 610 = 7D39 1
 620 = CECC 3
 630 = 9A41 2
 640 = 49CB F
 650 =  1B8 E
 660 = 3E5D B
 670 = 49FD 3

 680 = 410B 9
 690 = 9176 6
 700 = CECC 3
 710 = 5F0B 4
 720 = 6C3F A
 730 = F390 A
 740 = 49CB 5
 750 =  1B8 1
 760 = 3E5D C
 770 = 49FD 1
 780 = 410B C
 790 = 777B 3
 800 = CECC 4
 810 = FEEA 2
 820 = 6C3F 4
 830 = F390 5
 840 = 529D C
 850 = 9DD7 E
 860 = CECC F
 870 = 99A1 0
 880 = 6C3F D
 890 = 4418 F
 900 = A440 5
 910 = 8DA9 D
 920 = 4418 A
 930 = A440 2
 940 = 7C55 6
 950 = 3CB1 F
 960 = A440 B
 970 = 3591 0
 980 = 48D3 3
 990 = 7326 D
1000 = FD18 2
1010 = 2CA0 5
1020 = 9B8C C

1030 = 61BC 1
1040 = 49A5 F
1050 = CD0D 5
1060 = CADC 7
1070 = 8540 4
1080 = 893F C
1090 = 6BC1 8
1100 = 48D3 D
1110 = 584D 4
1120 = 7B47 B
1130 = E86B 1
1140 = F390 C
1150 = 4418 A
1160 = DB05 8
1170 = 6A2B F
1180 = 93EA 5
1190 = E3FA 6
1200 = 6807 4
1210 = B96C 9
1220 = A9A0 A
1230 = CF58 5
1240 = 3E57 A
1250 = BD53 F
1260 = CF58 A
1270 = 272D 5
1280 = B313 3
1290 = 650D F
1300 = C777 9
1310 = 6295 B
1320 = BD53 8
1330 = F7C8 5
1340 = 626A A
1350 = 3E5D 7
1360 = 49FD 1
1370 = 410B C

1380 = 9176 2
1390 = 9C78 F
1400 = BD53 F
1410 = AC1B E
1420 = 37B5 A
1430 = 79AE B
1440 = 1766 5
1450 = 1AF2 0
1460 = 51DC 5
1470 = 5AA2 6
1480 = 61BC 2
1490 = 2E60 3
1500 = 1403 D
1510 =  52F D
1520 = 2D46 1
1530 =  C7F 4
1540 = 179E B
1550 = F8CF E
1560 = 49CB B
1570 =  1B8 A
1580 = B5D1 A
1590 = 2D26 0
1600 = F8CF E
1610 = 61BC 1
1620 = D9D8 C
1630 = FF0A 5
1640 =  A86 9
1650 = 7EE3 8
1660 = FEF7 C
1670 = FF0A 9
1680 =  A86 6
1690 = 4DD2 8
1700 = 1E67 F
1710 = 9392 D
1720 = C47B F

1730 = 3050 0
1740 =  E46 E
1750 = 9392 5
1760 = 2D46 D
1770 = 332F 6
1780 = 9087 B
1790 = 5C7F 3
1800 = 24FA 4
1810 =   80 3
1820 = EA12 F
1830 = 24FA F
1840 = 9611 A
1850 = 8BEC 1
1860 = 24FA E
1870 = 947D 2
1880 = CB73 B
1890 = 9F32 2
1900 = 24FA 8
1910 = 3169 5
1920 = E53A 4
1930 = 24FA F
1940 = D2AA C
1950 = D2AA 7
1960 = D2AA E
1970 = 49F2 5
1980 = BF8D 5
1990 = 24FA B
2000 =   BE A
2010 = 244E A
2020 = EB77 0
2030 = D73F 9
2040 = D2AA 8
2050 = 18A7 7
2060 = DB52 6
2070 = 908E 5

2080 = 1971 C
2090 = 24FA 6
2100 =  387 C
2110 =  50B 3
2120 = 24FA E
2130 =  BBB E
2140 = 7030 0
2150 = 24FA F
2160 = 8FA2 9
2170 = 38B0 F
2180 = 24FA C
2190 = 8A7E C
2200 = 6592 1
2210 = 5B46 B
2220 = C4A3 E
2230 = 236E 2
2240 = 24FA 2
2250 = 28F5 E
2260 = 82B1 4
2270 = AD57 4
2280 = E0DC 6
2290 = 1971 D
2300 = 24FA D
2310 = 902A 0
2320 = 24FA 0
2330 = 8B58 8
2340 = 2C83 7
2350 = ED0F 7
2360 = 7A2C B
2370 = 6255 1
2380 = A1ED C
2390 = 7B73 7
2400 = ED0F B
```

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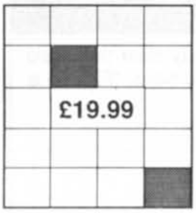

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```
 970    MOV     r0,#&FF
 980    STR     r0,[r12,#inuse]
 990    ADR     r0,code
1000    ADD     r1,r12,#&0C
1010    SWI     "XOS_AddCallBack"
1020    LDMFD   r13!,{r0-r6,r12}
1030    LDMFD   r13!,{pc}
1040 .code
1050    STMFD   r13!,{r0-r12,r14}
1060    ADR     r0,hotkey
; Place your alternative code
1070    SWI     "XOS_CLI"
; instead of these two lines
1080    MOV     r0,#&00
1090    SUB     r12,r12,#&0C
1100    STR     r0,[r12,#inuse]
1110    LDMFD   r13!,{r0-r12,pc}
1120 .keydecode
1130    STMFD   r13!,{r14}
1140    LDR     r12,[r12]
1150    CMP     r1,#&00
1160    BEQ     keys
1170    BL      checkon
1180    BVS     keyerror
1190    MOV     r5,r0
1200    MOV     r6,r1
1210    LDR     r4,[r12,#keystatus]
1220    STR     r3,[r12,#keystatus]
1230    CMP     r3,#&00
1240    CMPEQ   r3,r4
1250    LDMEQFD r13!,{pc}
1260    CMP     r3,#&00
1270    STREQ   r3,[r12,#keystatus]
1280    MOVEQ   r0,#&14
1290    ADREQ   r1,keypress
1300    MOVEQ   r2,r12
1310    SWIEQ   "OS_Release"
1320    LDMEQFD r13!,{pc}
1330    CMP     r3,r4
1340    STRNE   r3,[r12,#keystatus]
1350    MOVNE   r0,#&14
1360    ADRNE   r1,keypress
1370    MOVNE   r2,r12
1380    SWINE   "OS_Claim"
1390    CMP     r6,#&01
1400    LDMEQFD r13!,{pc}
1410    CMP     r6,#&02
1420    BNE     keyerror
1430    MOV     r1,r5
1440    ADD     r1,r1,#&01
1450    MOV     r0,#&C000000A
1460    SWI     "OS_ReadUnsigned"
1470    STR     r2,[r12,#key]
1480    LDMFD   r13!,{pc}
1490 .keyerror
1500    ADR     r0,keyerrorm
1510    LDMFD   r13!,{r14}
1520    ORRS    pc,r14,#&10000000
1530 .keys
1540    ADR     r0,keysm
1550    SWI     "OS_Write0"
1560    LDR     r0,[r12,#keystatus]
1570    CMP     r0,#&00
1580    ADREQ   r0,off
1590    ADRNE   r0,on
1600    SWI     "OS_Write0"
1610    LDMFD   r13!,{pc}
1620 .checkon
1630    LDRB    r2,[r0],#&01
1640    AND     r2,r2,#&DF
1650    CMP     r2,#ASC"O"
1660    ORRNES  pc,r14,#&10000000
1670    LDRB    r2,[r0],#&01
1680    AND     r2,r2,#&DF
1690    CMP     r2,#ASC"N"
1700    MOVEQ   r3,#&01
1710    MOVEQ   pc,r14
1720    CMP     r2,#ASC"F"
1730    ADDEQ   r0,r0,#&01
1740    MOVEQ   r3,#&00
1750    MOVEQ   pc,r14
1760    ORRS    pc,r14,#&10000000
1770 .default
1780    EQUS    "Set Alias$PressKey Gra
bScreen|M"+CHR$13
1790 ; Change the last line to execute
a different '*' command by default
1800.   ALIGN
1810 .grabscreen
1820    EQUS    "Set Alias$GrabScreen S
etEval GrabScreen%Number GrabScreen%Numb
er+1|MScreenSave :0.$.Screen|<GrabScreen
%Number>"+CHR$13
1830    ALIGN
1840 .grabscreen2
1850    EQUS    "SetEval GrabScreen%Num
ber 0"+CHR$13
1860    ALIGN
1870 .initerror
1880    EQUD    &27200
1890    EQUS    "HotKey system unable t
o claim required workspace"+CHR$0
1900    ALIGN
1910 .commandtable
1920    EQUS    "Key"+CHR$0
1930    ALIGN
1940    EQUD    0
1950    EQUD    0
1960    EQUD    0
1970    EQUD    help
1980    EQUS    "HotKey"+CHR$0
1990    ALIGN
2000    EQUD    keydecode
2010    EQUD    &00020000
2020    EQUD    keysyntax
2030    EQUD    keyhelp
2040    EQUD    0
2050 .keyerrorm
2060    EQUD    &27201
2070 .keysyntax
2080    EQUS    "Syntax: *HotKey [<ON
|OFF> [<key>]]"+CHR$0
2090    ALIGN
2100 .keysm
2110    EQUS    "The Hot Key system is
currently "+CHR$0
2120    ALIGN
2130 .on
2140    EQUS    "on."+CHR$10+CHR$13+CHR
$0
2150    ALIGN
2160 .off
2170    EQUS    "off."+CHR$10+CHR$13+CH
R$0
2180    ALIGN
2190 .hotkey
2200    EQUS "PressKey"+CHR$13
2210 .help
2220    EQUS    "The Hot Key system act
ivates the user-defined command 'PressKe
y' upon the depression of a configurable
 key."+CHR$10+CHR$13
2230    EQUS    "The system may be swit
ched on or off using a star command and
optionally, the hot key may be changed t
o suit the application."+CHR$0
2240    ALIGN
2250 .keyhelp
2260    EQUS    "*HotKey switches the H
ot Key system on or off."+CHR$10+CHR$13
2270    EQUS    "*HotKey can take an AS
CII keycode to allow a key to be program
med from the default to activate the uti
lity. The default is the 'print' key."+C
HR$10+CHR$13
2280    EQUS    "*HotKey without a para
meter reflects the current state."+CHR$1
0+CHR$13
2290    EQUS    "Syntax: *HotKey [<ON
|OFF> [<key>]]"+CHR$0
2300    ALIGN
2310    EQUS    "HotKey by Gareth S. Lo
ng."+CHR$13
2320    ALIGN
2330 ]
2340 NEXT
2350 ENDPROC
2360 DEFPROCsave
2370 OSCLI"Save "+Module$+" "+STR$~code
%+" "+STR$~(code%+P%)
2380 OSCLI"SetType "+Module$+" Module"
2390 OSCLI"Key 1 *RMLoad "+Module$+"|M"
2400 ENDPROC
```

MICRO MEMORIES

Facts and tips you may have forgotten... or never known

HAVE you ever wanted to disable Escape, or totally clear the Basic program in memory if Break is pressed? Well if you have, *FX 200 is just what you've been looking for.

There are four variations of the command:

Command	Action
*FX 200,0	Enable Escape. Leave memory intact if Break is pressed
*FX 200,1	Disable Escape
*FX 200,2	Clear memory on Break
*FX 200,3	Combine the effects of *FX 200,1 and *FX 200,2

You should be careful when using this command because you may lose vital data once your program is running as there could be no way out, so always save your work before running it.

When debugging a program you may need to use Break or Escape to leave it, so to avoid any unwanted action taking place, don't insert the *FX 200 command until you are sure the program works.

All program listings in this issue can be downloaded FREE on...
MicroLink

Take a touch of textual intercourse...

The lighthearted saga of two micro addicts continues

Dear Trev

If you managed to decipher my last letter – I've still to get the hang of Maxi Warehouse's word processor – you'll know about GUIs (Gormless User Interfaces) and OSCLIs (Only Slow Clots Like Icons) and how I ended up at the university's microcomputer laboratory.

I felt really sorry for all those poor little BBCs and Amigas pushing pathetically against their chicken wire pens, or Faraday cages as Bill said they were called. Apparently they're doing research into computer viruses as well as GUIs.

And they've made a breakthough! It seems Bill left some discs lying around without their wallets on and when he star dotted them he found what he thought was rubbish but when he ran the program his Amiga was cured of its virus!

He says that it's the computer equivalent of penicillin and he's going to call it an unclebiotic (as he says calling it an antibiotic is female chauvinism).

Doreen thinks he's got a flaming cheek. And I'm not sure about these viruses being all that new. We've always had bugs going round our beebs.

Anyway, I knew it was going to be a bad day when Doreen turned up wearing a "Wimp users do it with mice" badge. She claimed this was in response to Bill's usual "I've a likin' for an icon" badge.

Things looked up when Bill introduced us to Helen, his research assistant. She was wearing a "Cat lovers are pretty kinky" tee shirt and looked the part.

"Oh" she purred, logic probe in hand, as I said I liked the sentiment, "are you an animal lover?"

"I could be", I replied before D. could stop me.

"Helen will introduce you to Wimps," said Bill.

"We've already met you", snarled Doreen. Which just about set the tone for what followed.

"I'm told you use OSCLIs to communicate with your micro", Helen remarked as she showed me her equipment, which was pretty impressive.

"Yes, I like a bit of textual intercourse now and then".

"Well in this experiment we'll be using icons. We're revolutionising human-computer interaction by using icons or pictures instead of words".

"Like fruit machines and the signs on loos," D. murmured.

Helen ignored her (I wonder if she could teach me how to do that?) and proceeded to show us how it all worked.

"We'll be using a workstation," she said pointing to what looked like a micro to me.

"What's the difference between that and a micro?" I asked.

"The price", she replied. "And it's attached to an IBM mainframe".

"What's IBM stand for?" D. asked.

"Instead Buy a Micro".

The day went on like that. Helen introduced me to the Wimps I was to use. Apparently it was all supposed to be intuitive, but at first I found using the mouse a bit difficult. Then it clicked.

"Where are the curtains?" Doreen asked when shown the windows. And when I was taught how to drag boxes she said that that was more in Bill's line than mine.

The desktop was dismissed as too tidy. And where were the chains of paperclips and half-empty coffee cups? When Helen told her that it was a metaphor D. asked what did bullfighting have to do with anything?

Apparently the whole point of this new GUI was that users would create their own icons – which Andrea promptly condemned as blasphemous.

It didn't help when she kept yelling "open the box" in my ear, though I must admit that I wasn't happy that the GUI was called Pandora.

Needless to say, the whole thing was a disaster. Pandora was fun but slow. At least OSCLIs are prompt. And I'm used to them. In fact at the Rogues I'm now known as the Wizard of OSCLI. Guess who's the Wicked Witch of the West?

Yours

Bob

PS Doreen's got a new badge for me to wear at the next meeting. It says "OSCLI users do it with two fingers".

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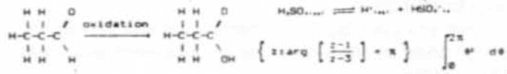

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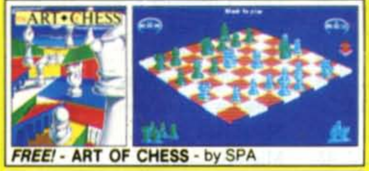
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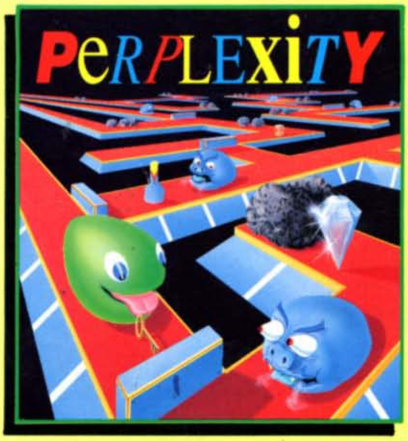

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A brilliant 'Top Ten' game by Peter Scott, featuring teleporters, lifts, springs, weird aliens to shoot, and lots, lots more, as you attempt to construct the core.

"Eighty screens of fun make this game my favourite"....Micro User

Barbarian II

Hyperball

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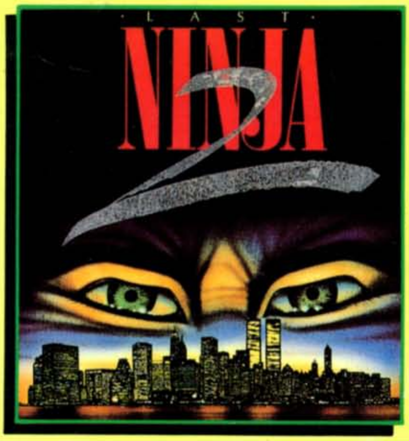

A Thug in the Cellar

Mugged on the Street

LAST NINJA 2 - Back with a Vengeance!

Born in a time of peace, lived in a time of war; the shadow warrior returns. Leaping the abyss of time he comes to fulfil his destiny!

DATELINE: 1990 THE PLACE: Downtown New York
THE QUEST: To destroy the eternal evil........Kunitoki!

Lots more fiendish adversaries, more colourful screens with superb graphics, a score-line, a timer... and lots and lots more exciting Ninja action. Are you ready for the thrills and skills of the Ninja in crime-filled Manhattan? Can you survive the six action-packed levels?

You start in the notorious CENTRAL PARK, with thugs, police and bees to get past, and shuriken stars and hamburgers to collect. Now to THE STREET, littered with down-and-outs and meths bottles. Take care in THE SEWERS to avoid the darkness and the crocodile. On to the forbidding opium factory in THE CELLAR and then to THE OFFICE and a secret computer code. Finally to KUNITOKI CASTLE with its immortal adversaries and the trickiest puzzle of all!

BBC Micro Cassette.....£9.95 each BBC Micro 5¼" Disc.....£11.95 each

(Compatible with the BBC B, B+ and Master 128 computers.)

BBC Master Compact 3½" Disc.....£14.95 each Electron Cassette.....£9.95 each

(The screen pictures show the BBC Micro versions of the games.)

SUPERIOR SOFTWARE ACORNSOFT

(Superior Software is a trading name of Superior Microcomputing Ltd.)
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